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Parsons et al.

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(54) **TWO PIECE SWIVEL ASSEMBLY FOR HANDCUFF**

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(73) Assignee: **Armament Systems & Procedures, Inc.**, Appleton, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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(22) Filed: **Feb. 1, 2005**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
E05B 75/00 (2006.01)

(52) **U.S. Cl.** **70/16**; 70/14

(58) **Field of Classification Search** 70/14, 70/15, 17–19, 30, 49, 16
See application file for complete search history.

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Primary Examiner—Suzanne Dino Barrett
(74) *Attorney, Agent, or Firm*—Welsh & Katz, Ltd.

(57) **ABSTRACT**

The handcuff assembly includes a bow pivotally connected to a cheek plate frame assembly which includes a unitized frame that is die stamped from a metal plate and which is overmolded with a polymer overmold. The unitized frame has interlocking tabs on folded side plates of a base frame. A swivel cup is fixed in the base frame of the cheek plate assembly prior to polymer overmolding. A swivel with a welded chain link mounted thereon includes a swivel pin which is received in the swivel cup.

12 Claims, 15 Drawing Sheets

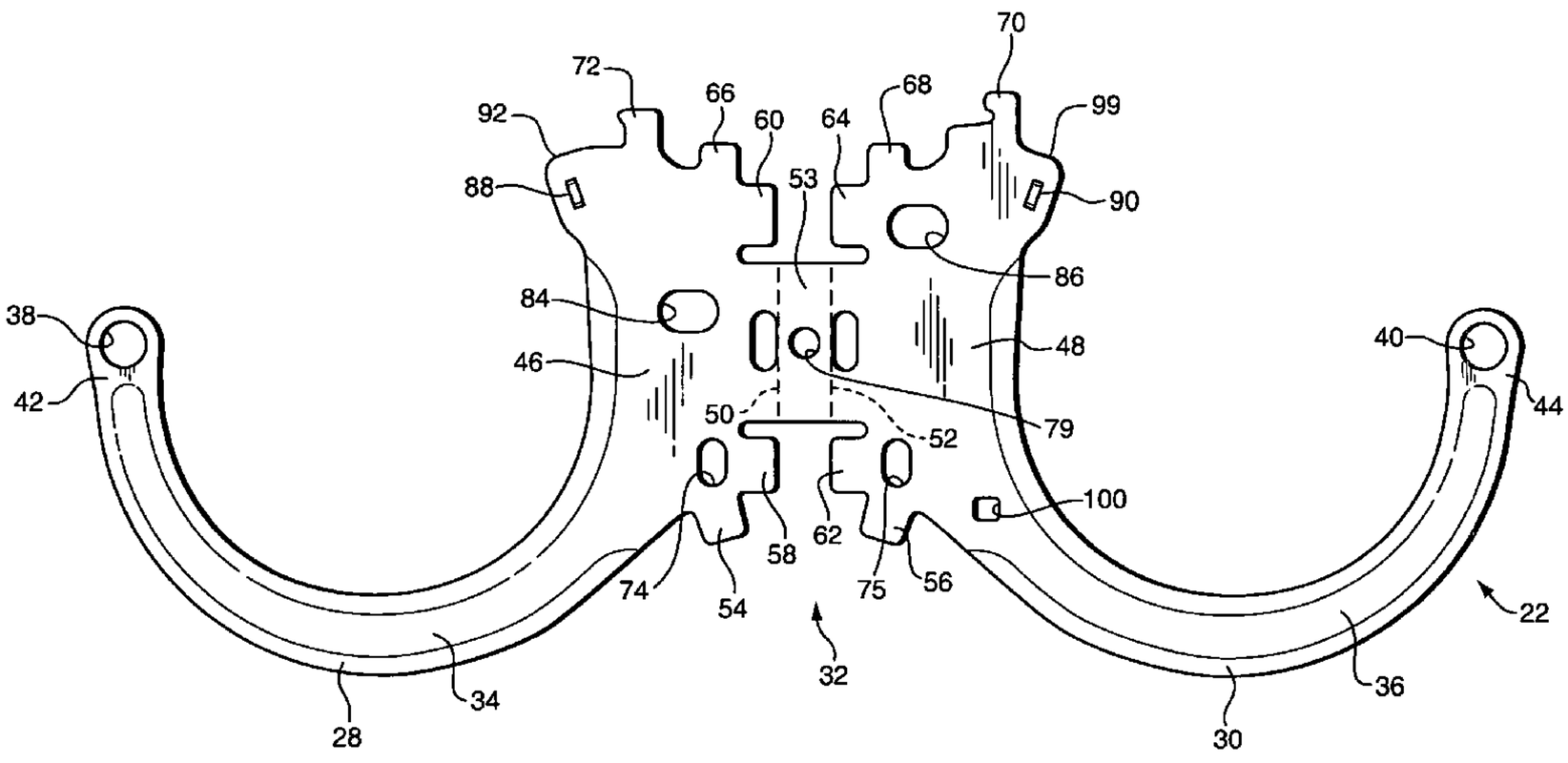

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FIG. 1

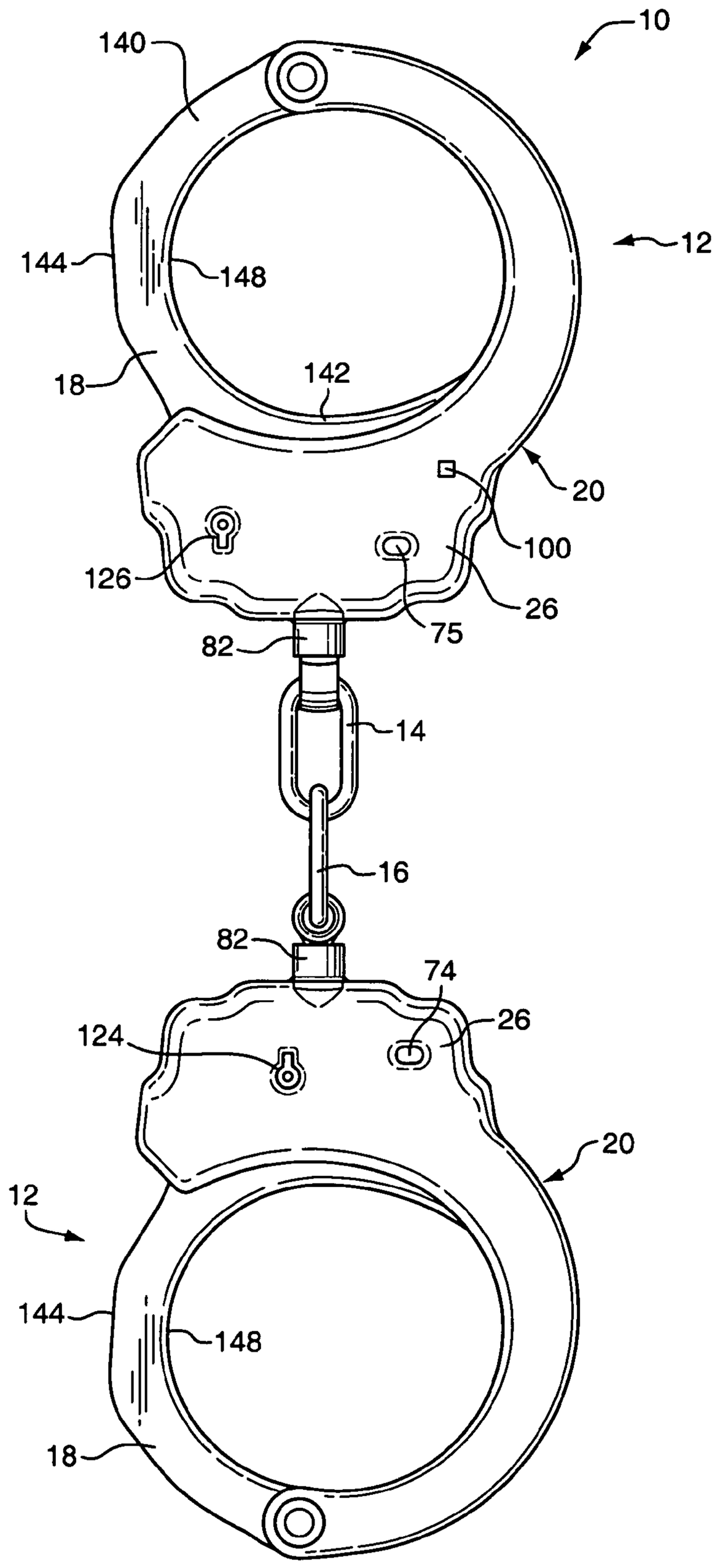
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FIG. 2

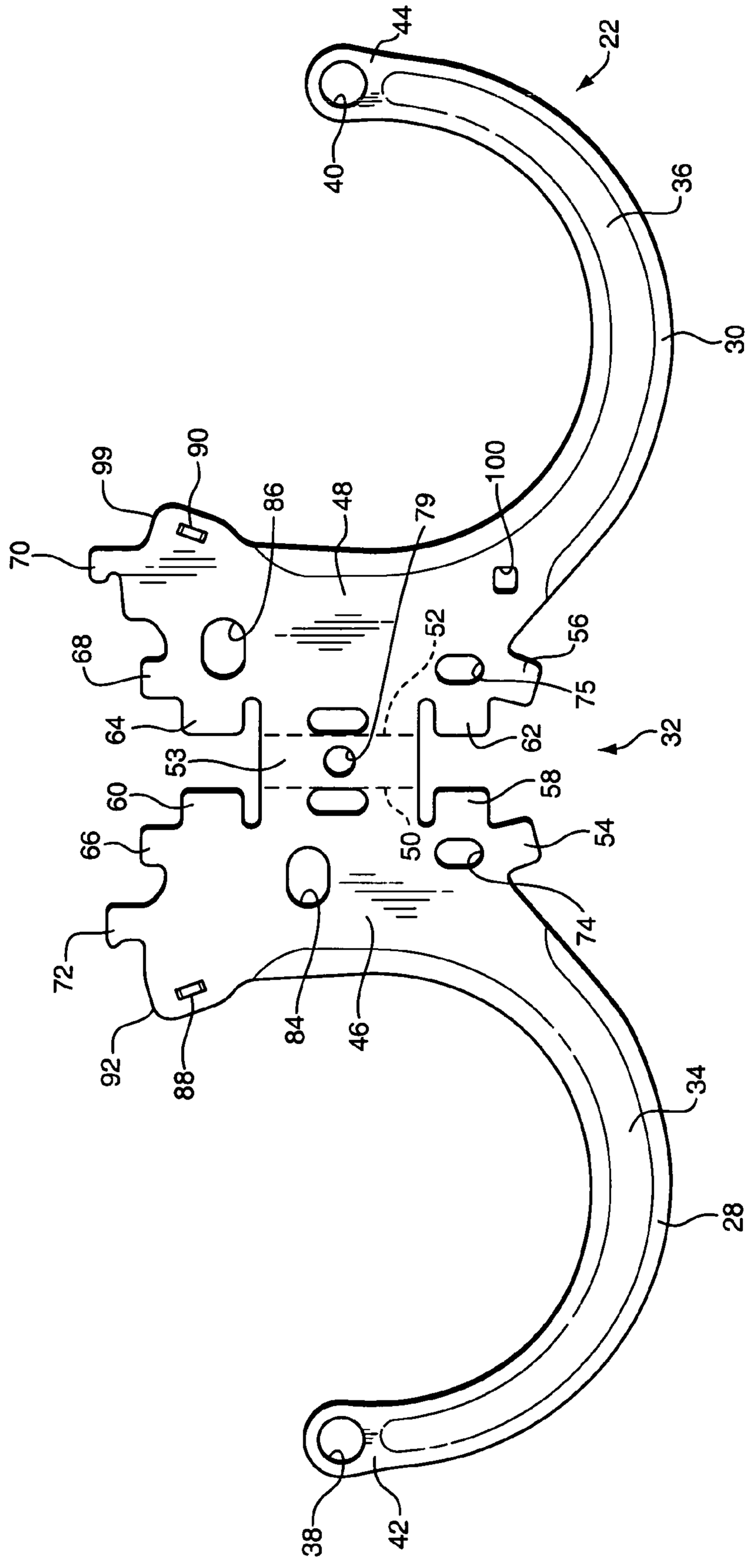
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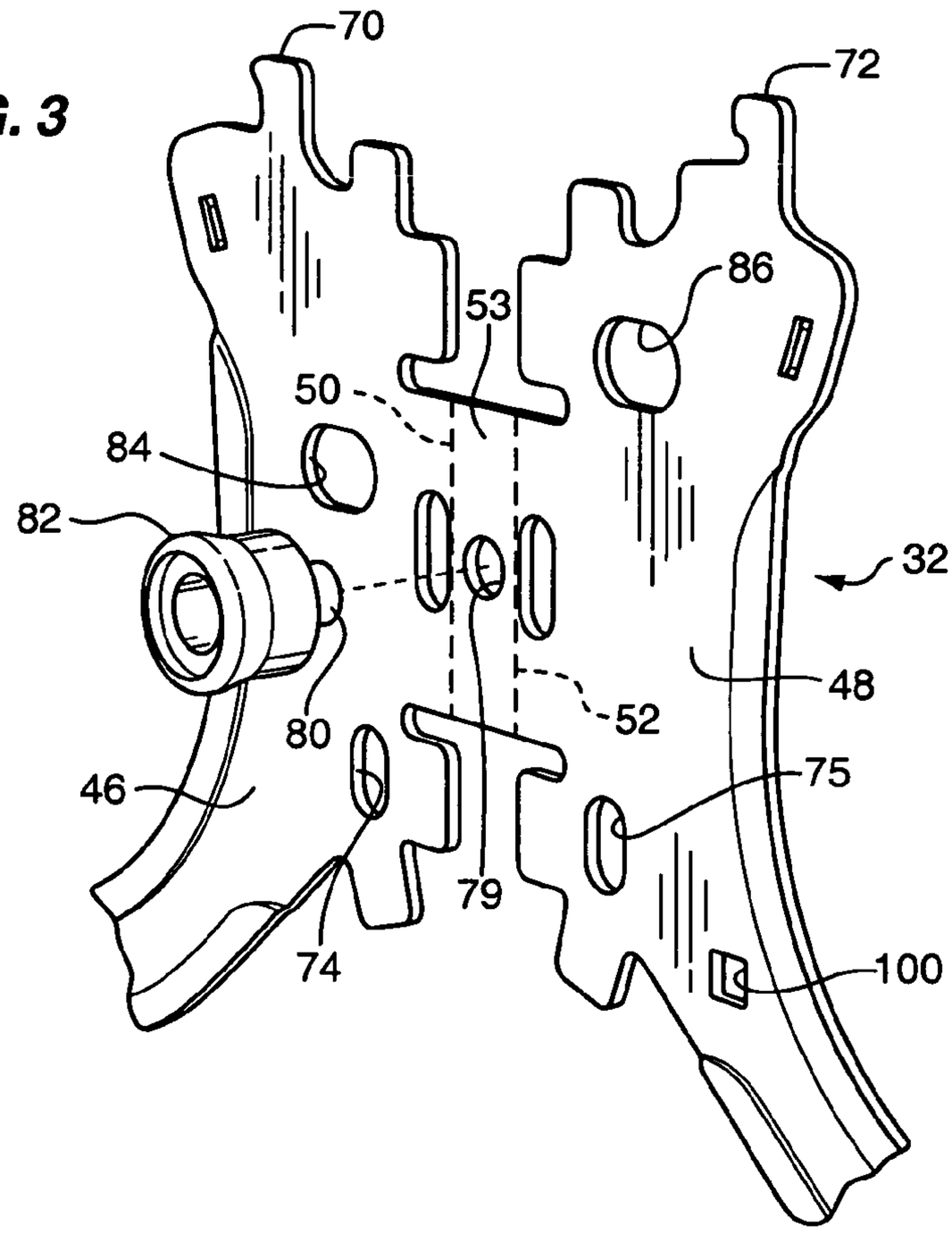
FIG. 3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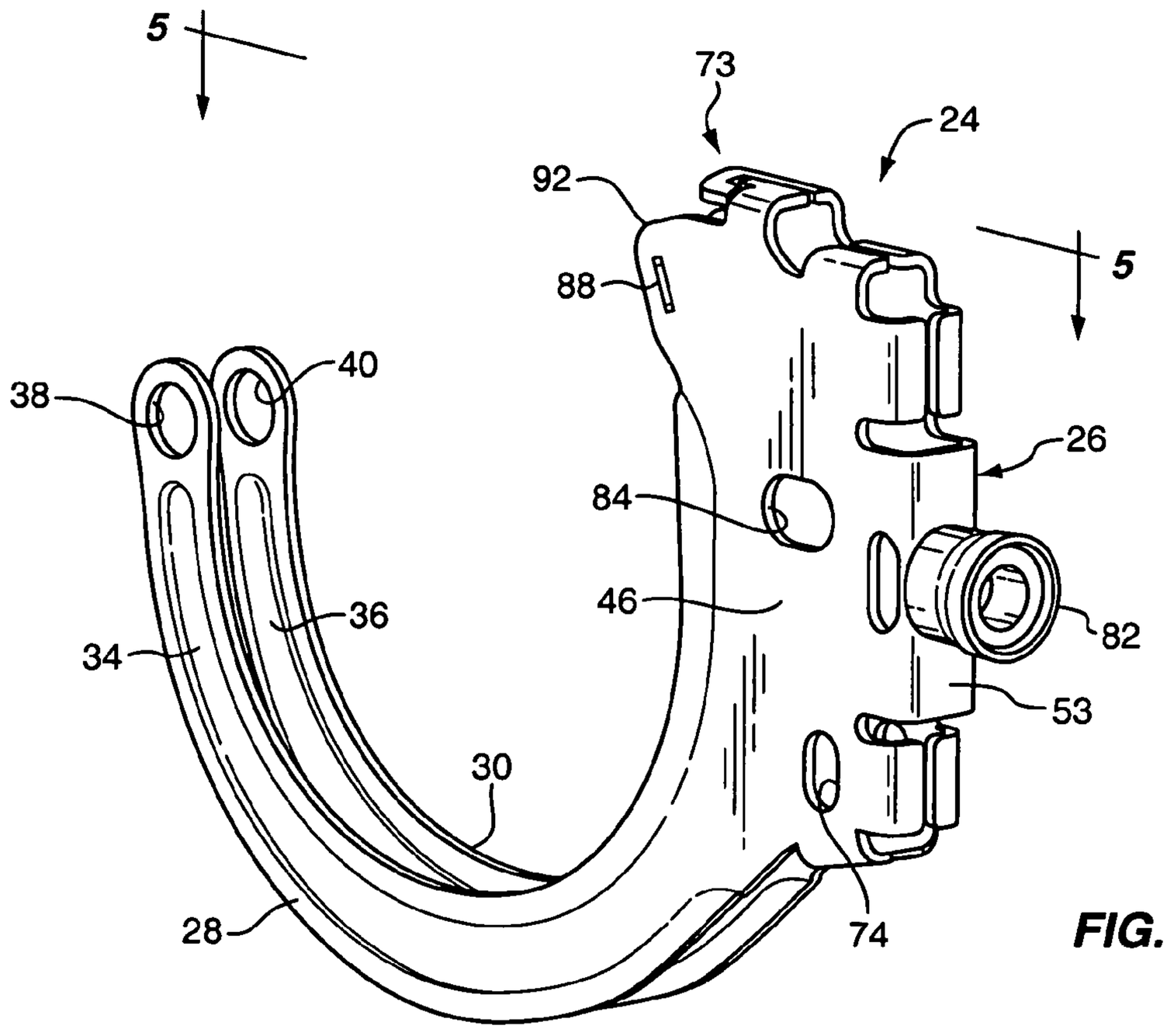
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FIG. 4

FIG. 5

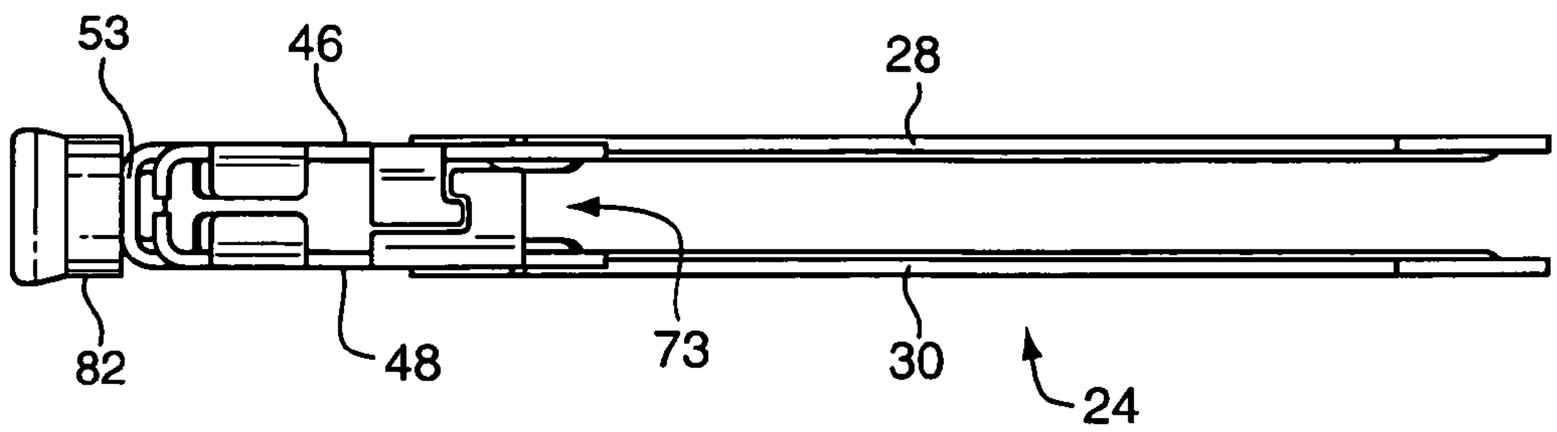
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FIG. 6

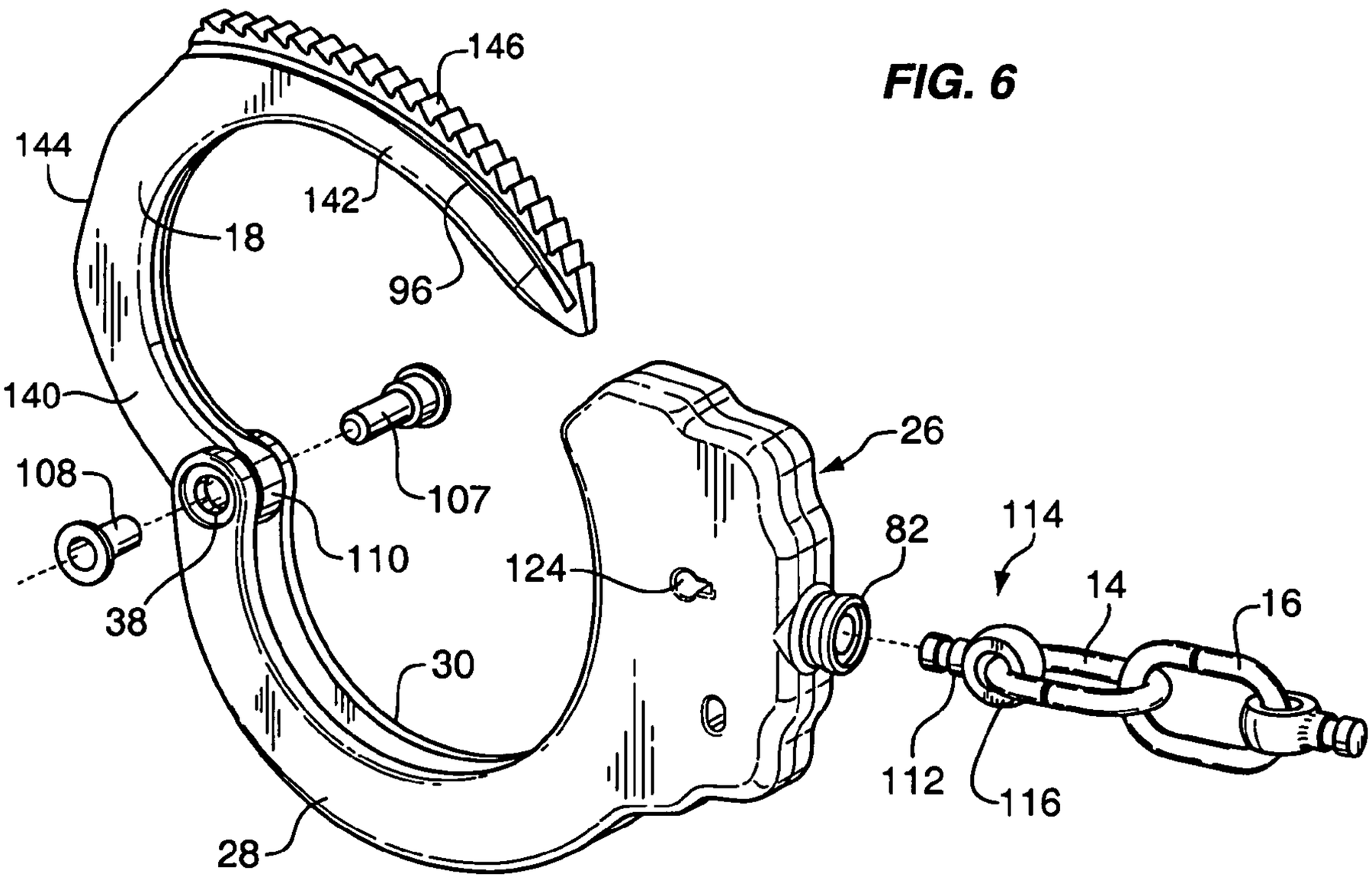
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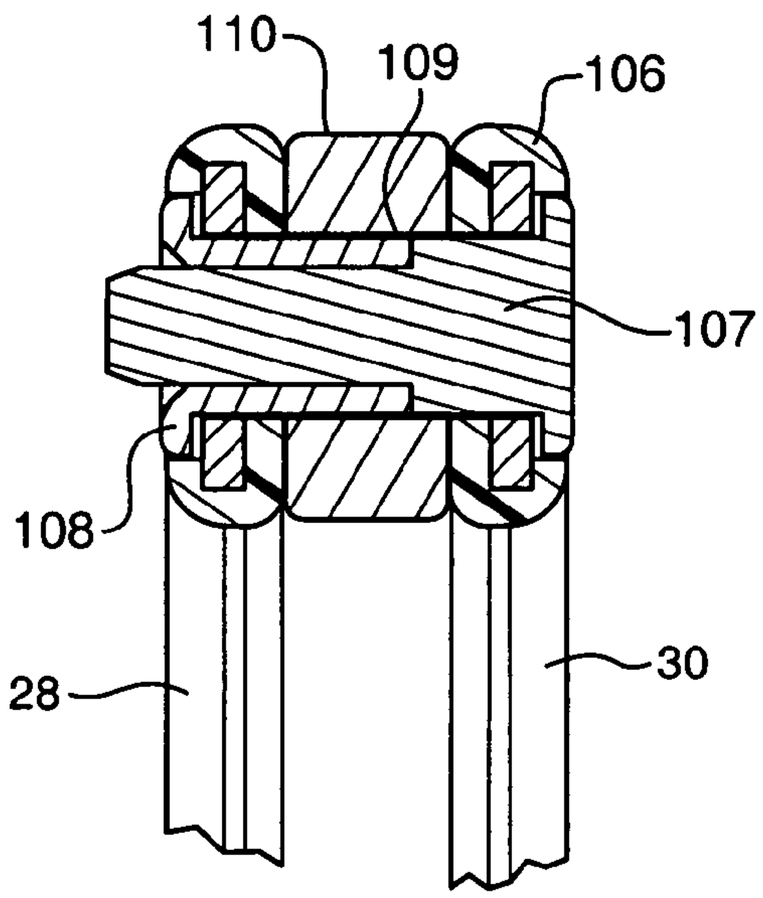
FIG. 7



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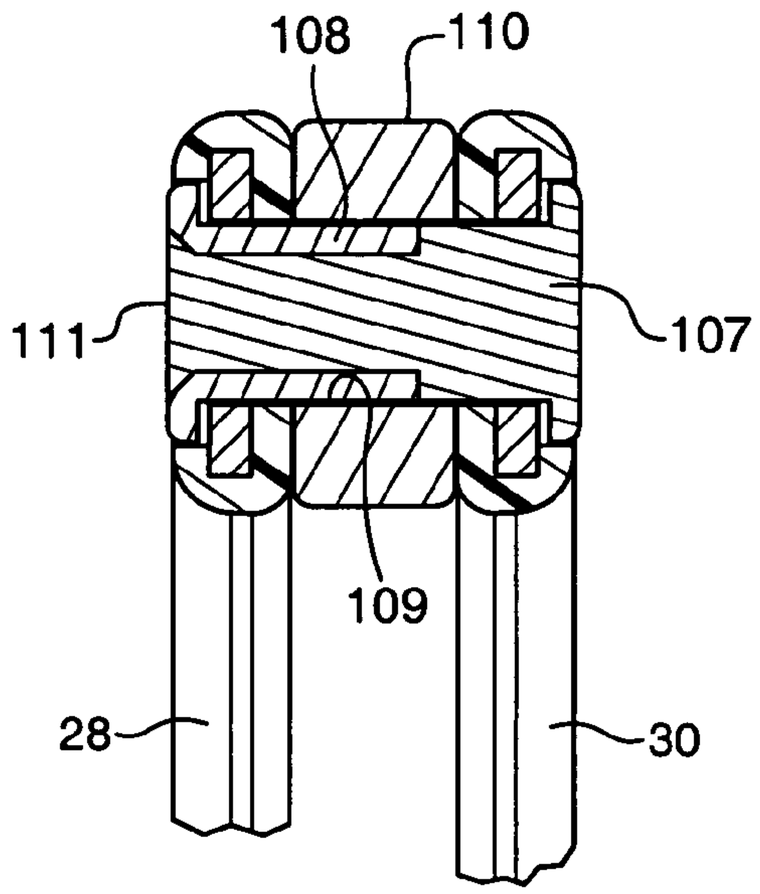

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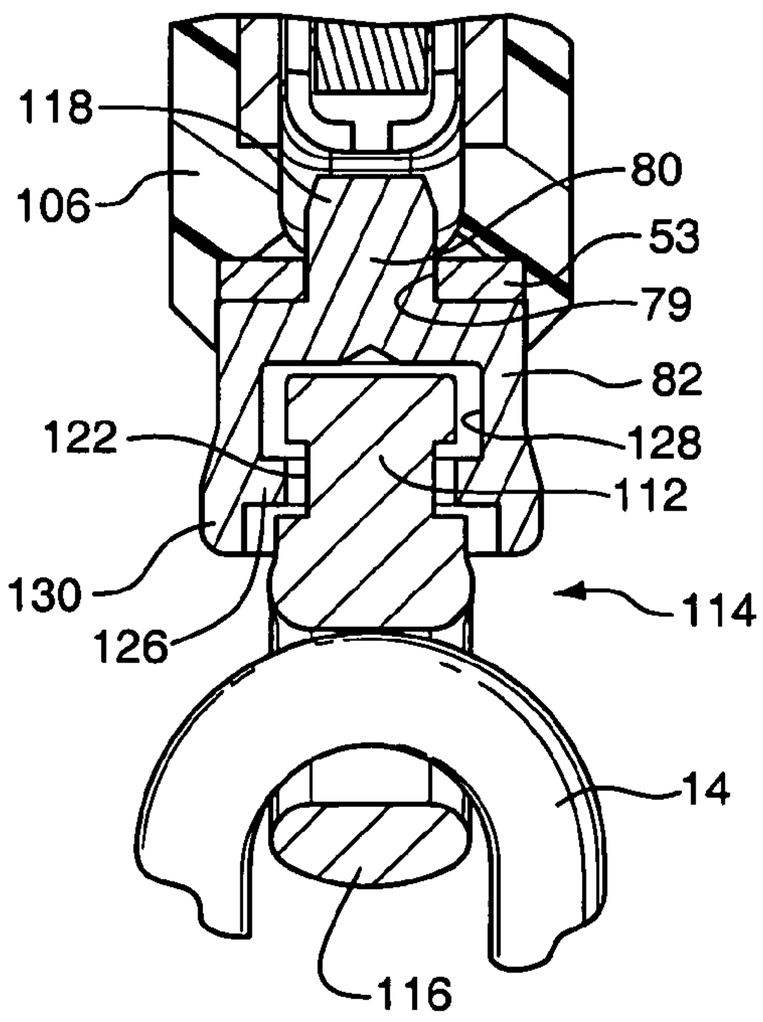

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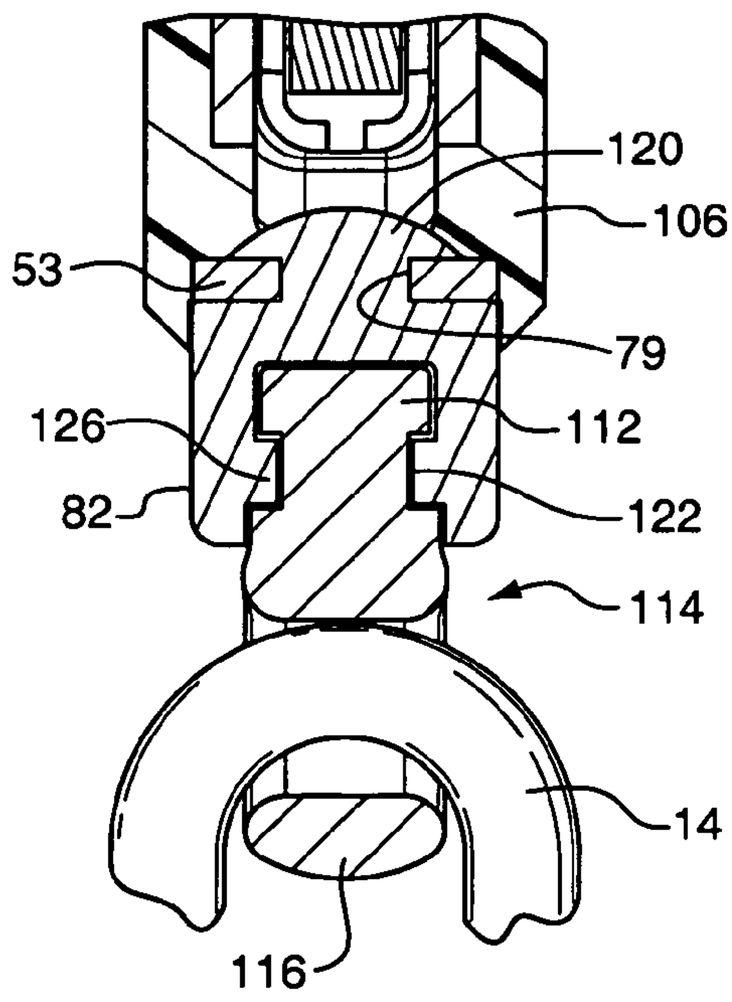

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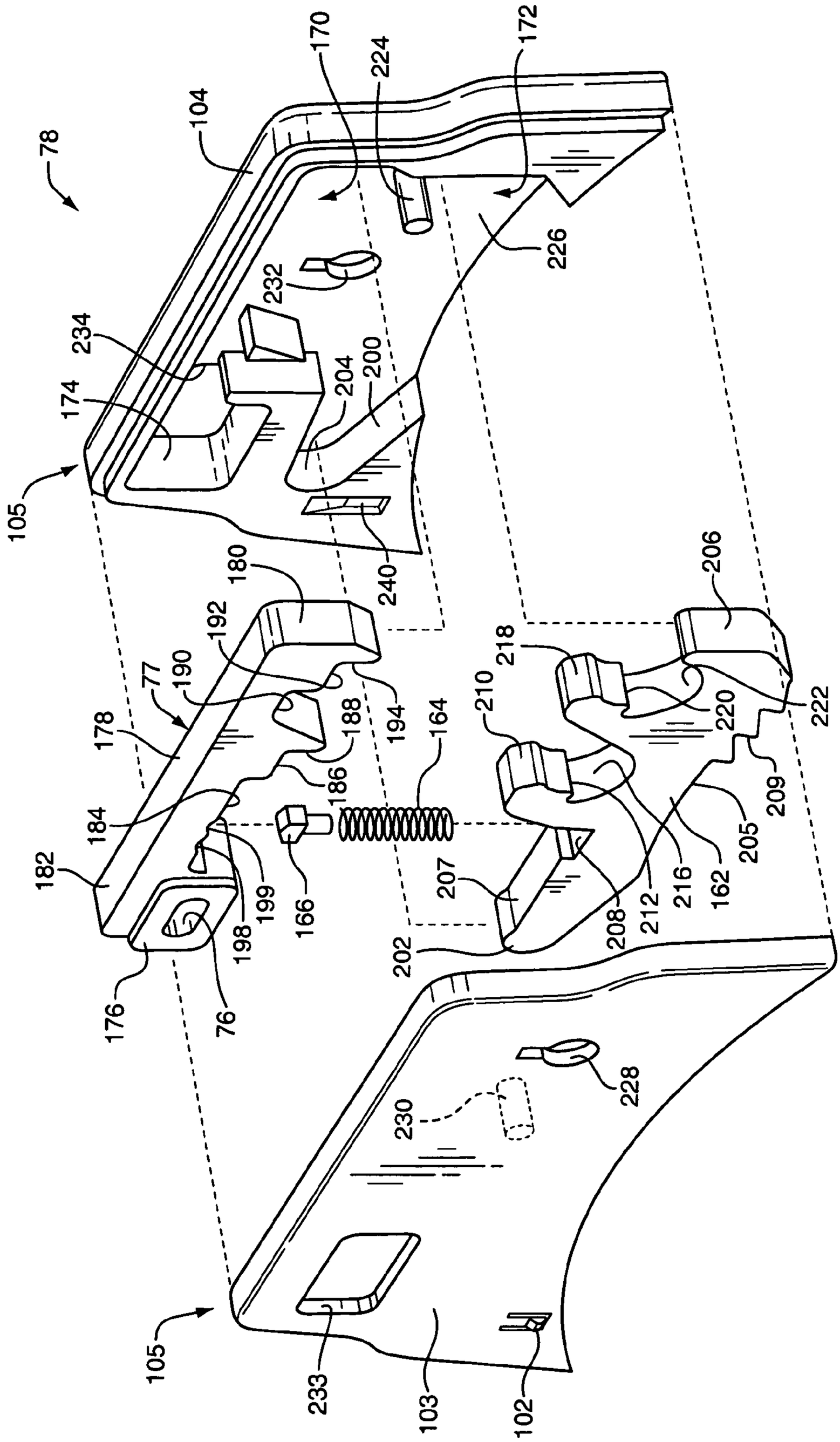
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FIG. 12

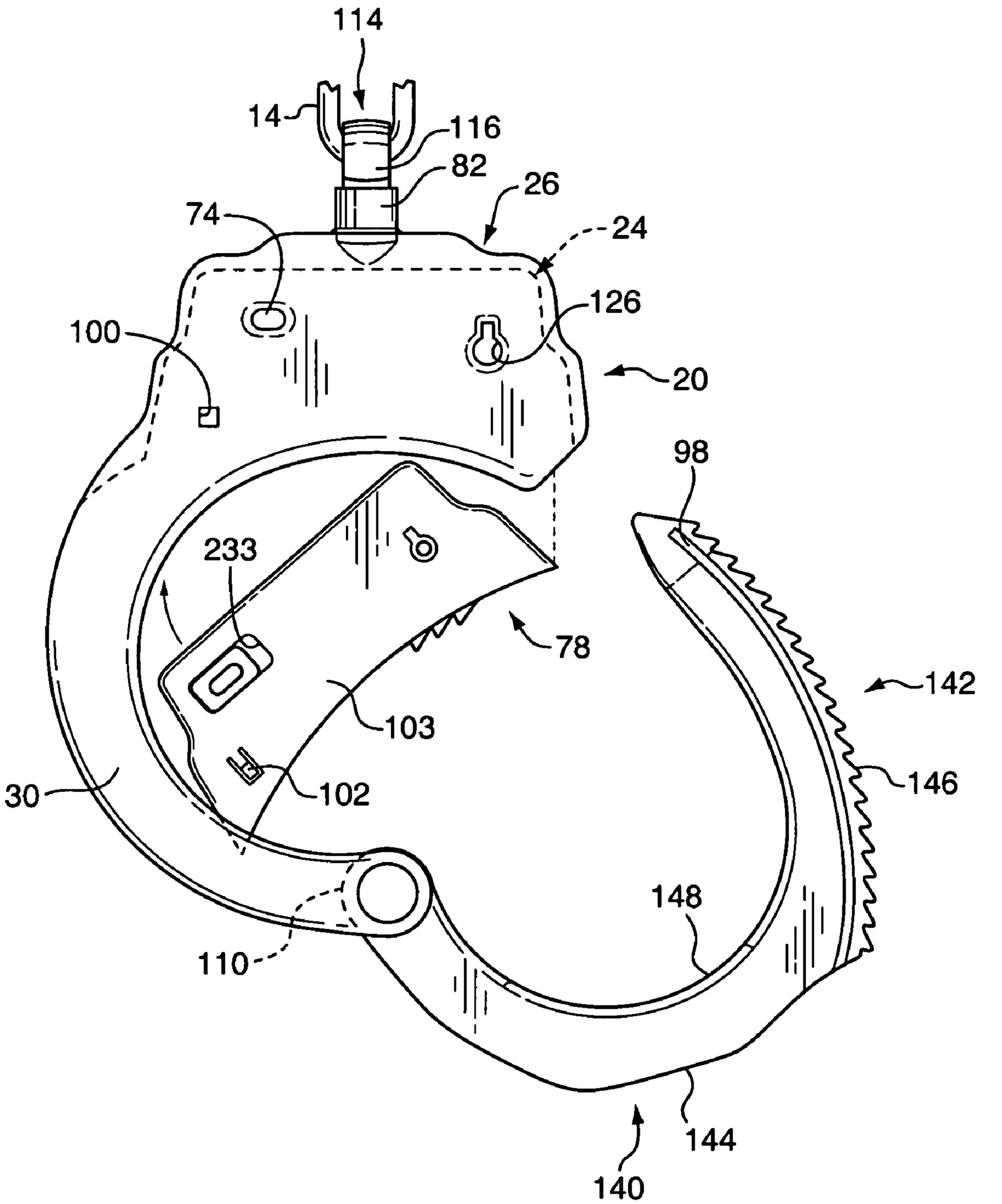
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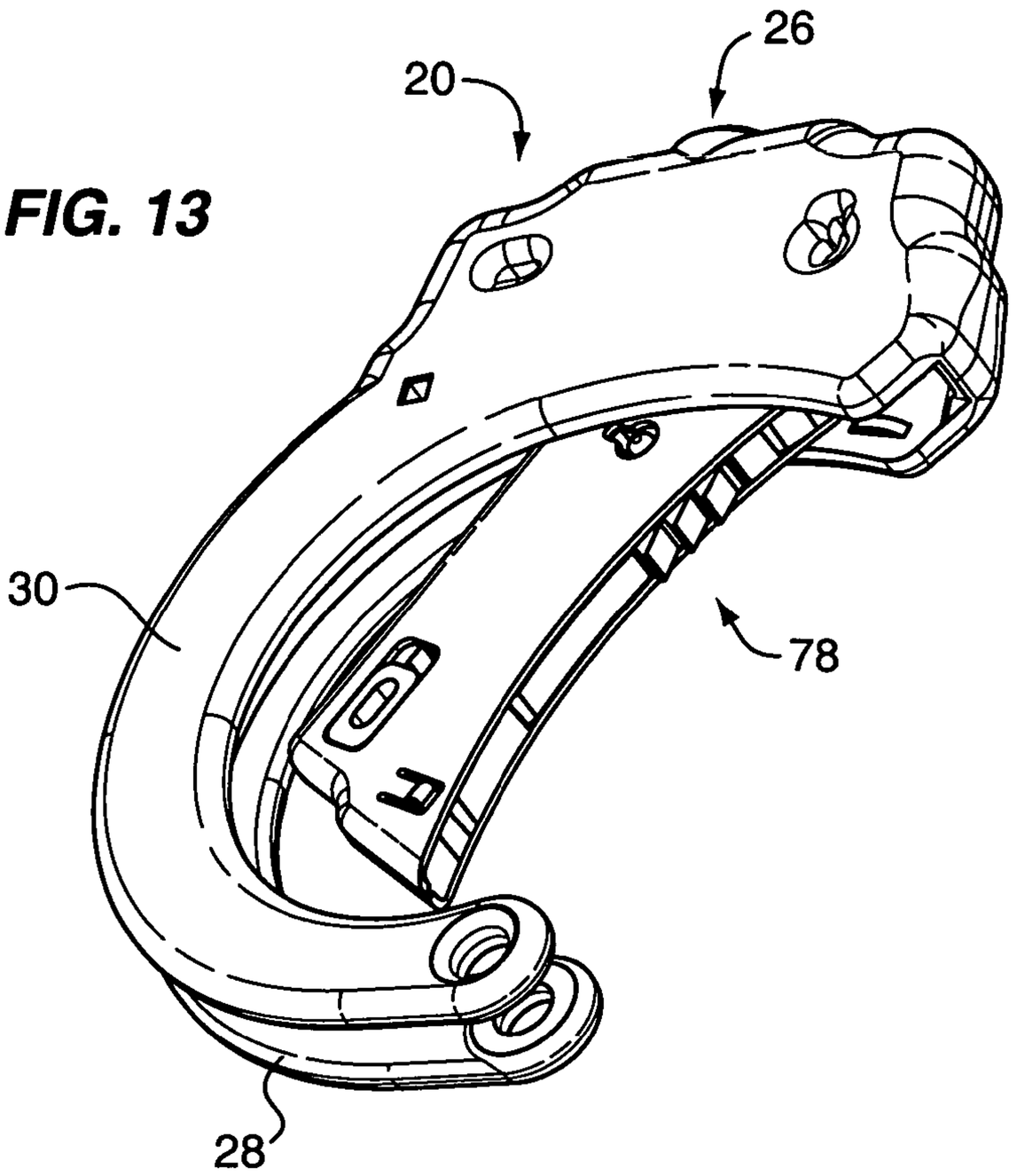
FIG. 13



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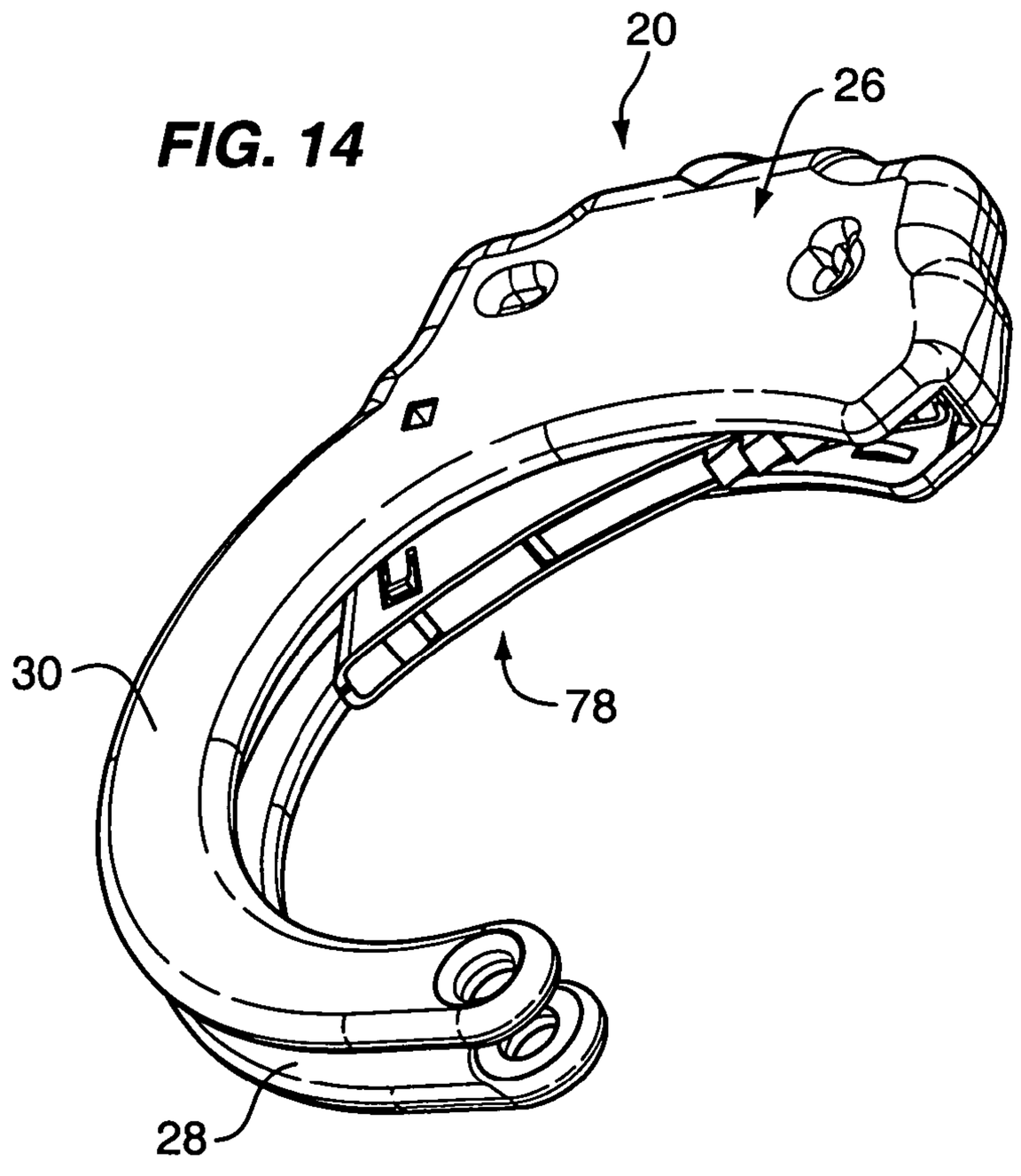

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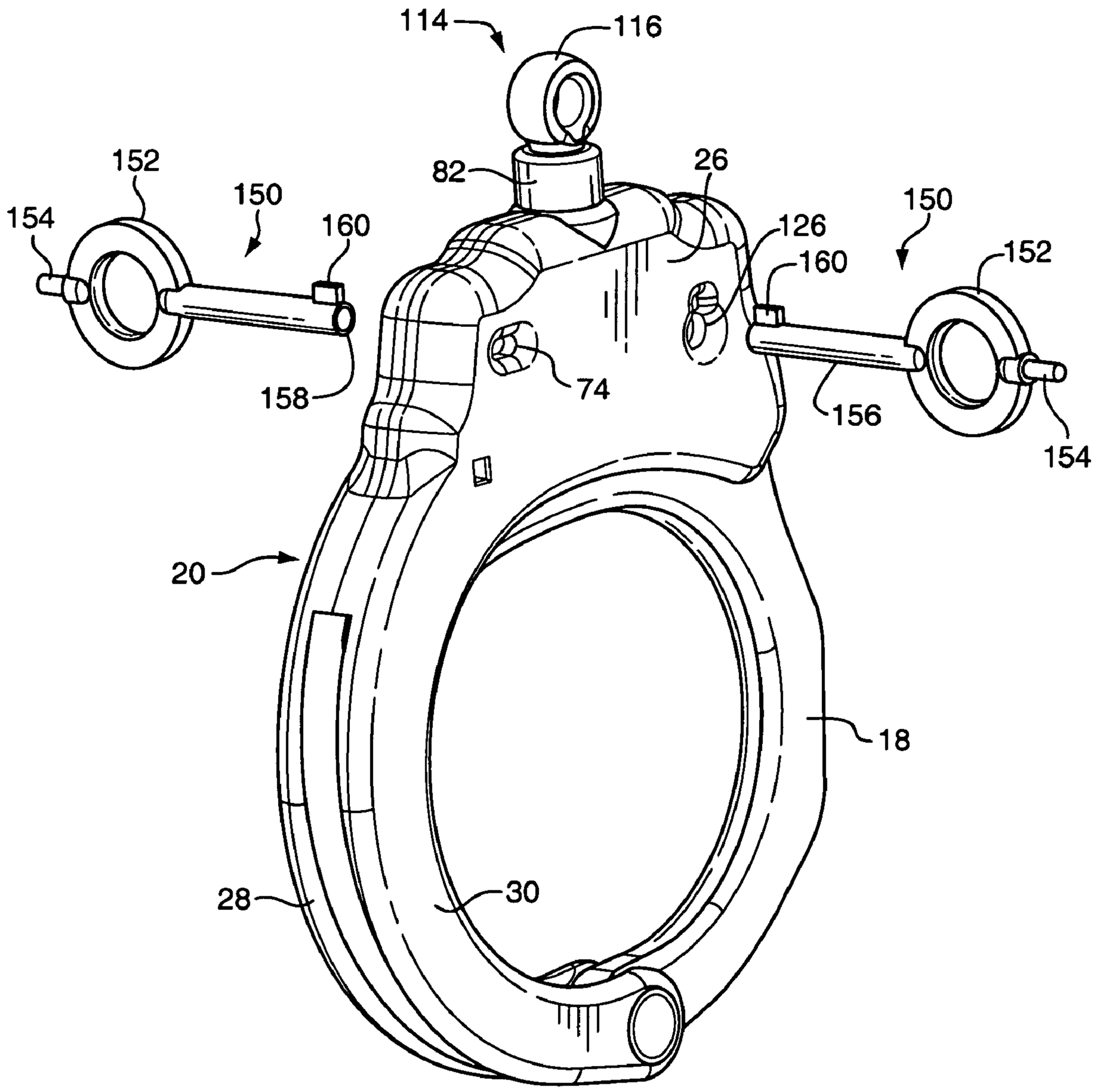
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FIG. 16

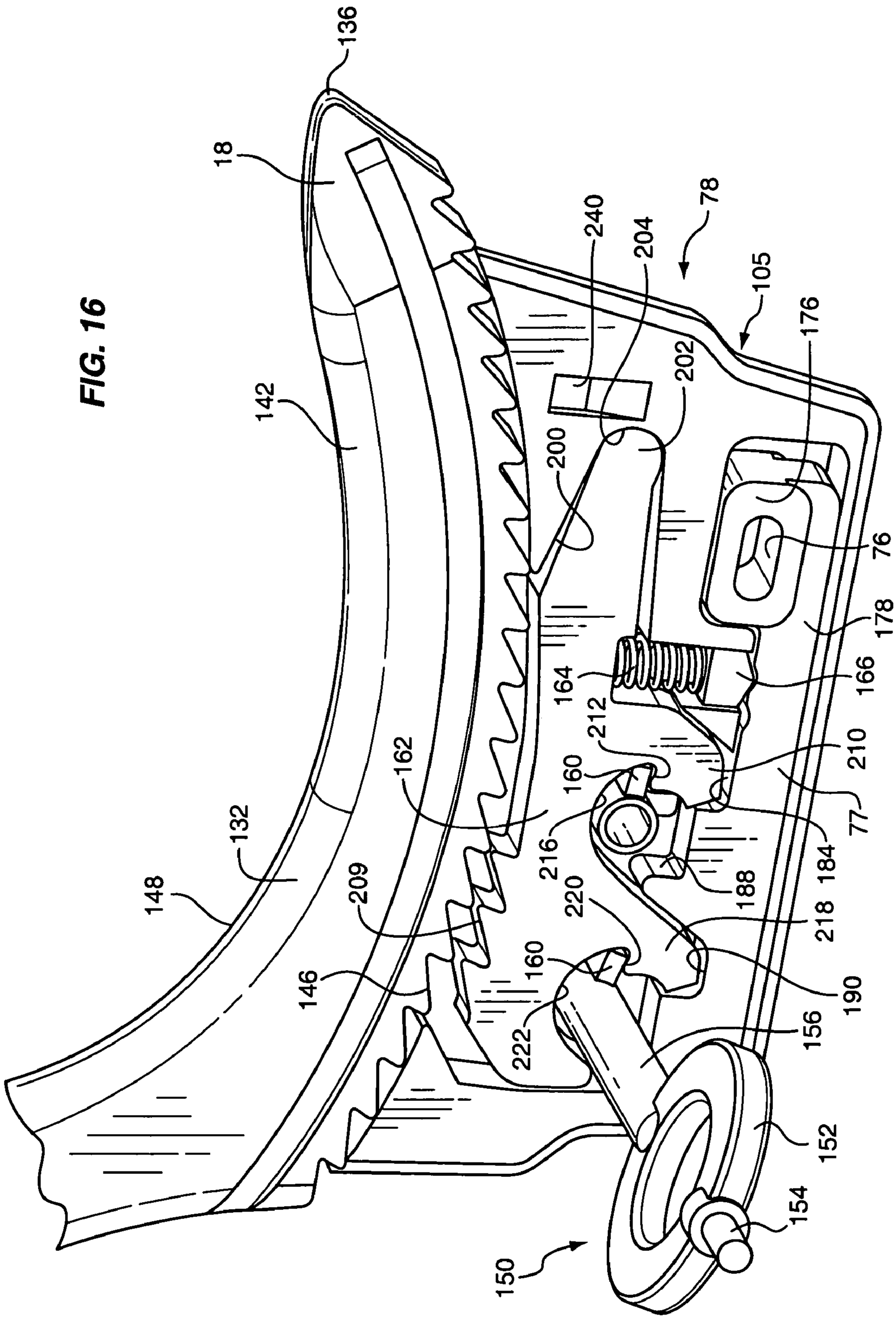
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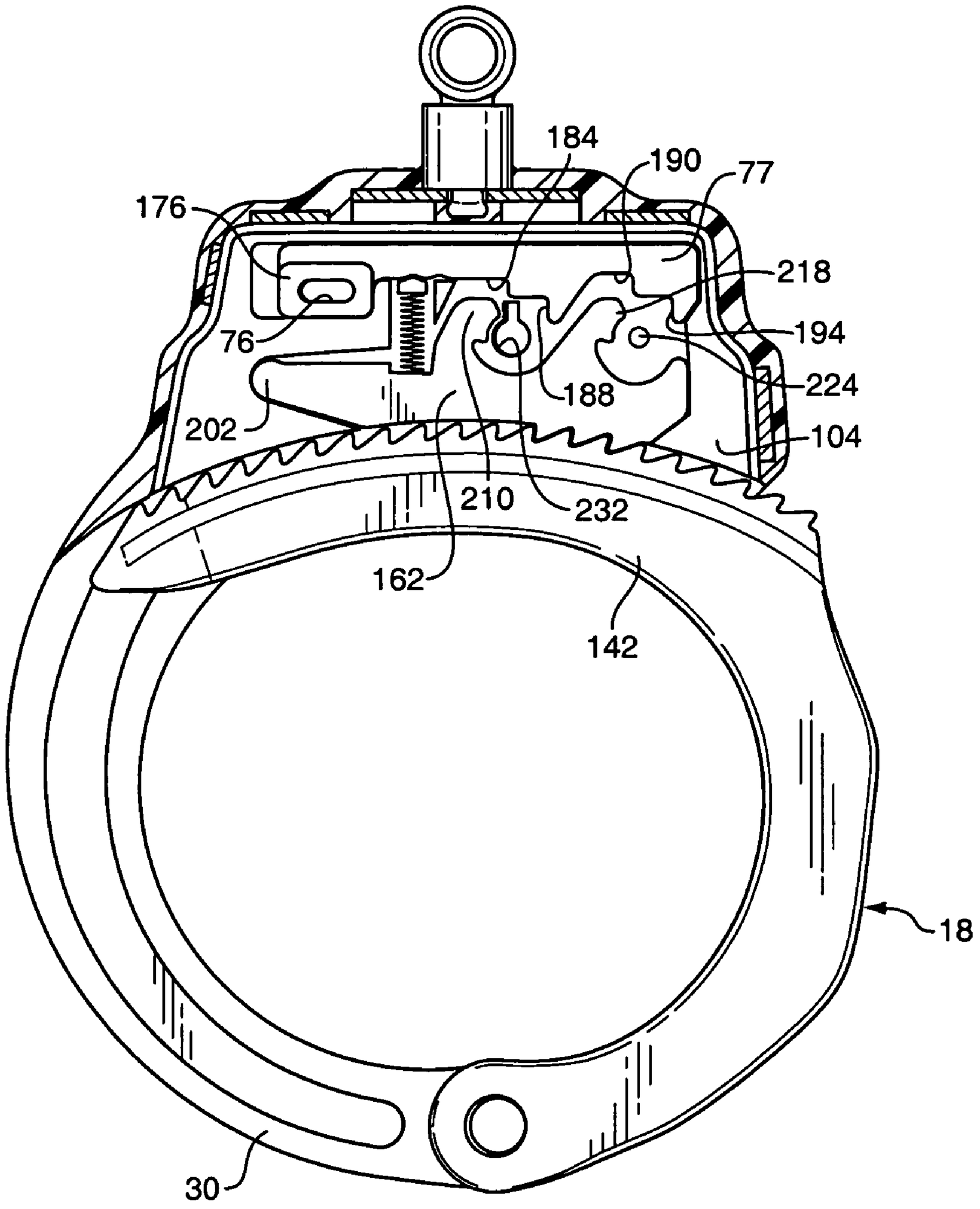
FIG. 17



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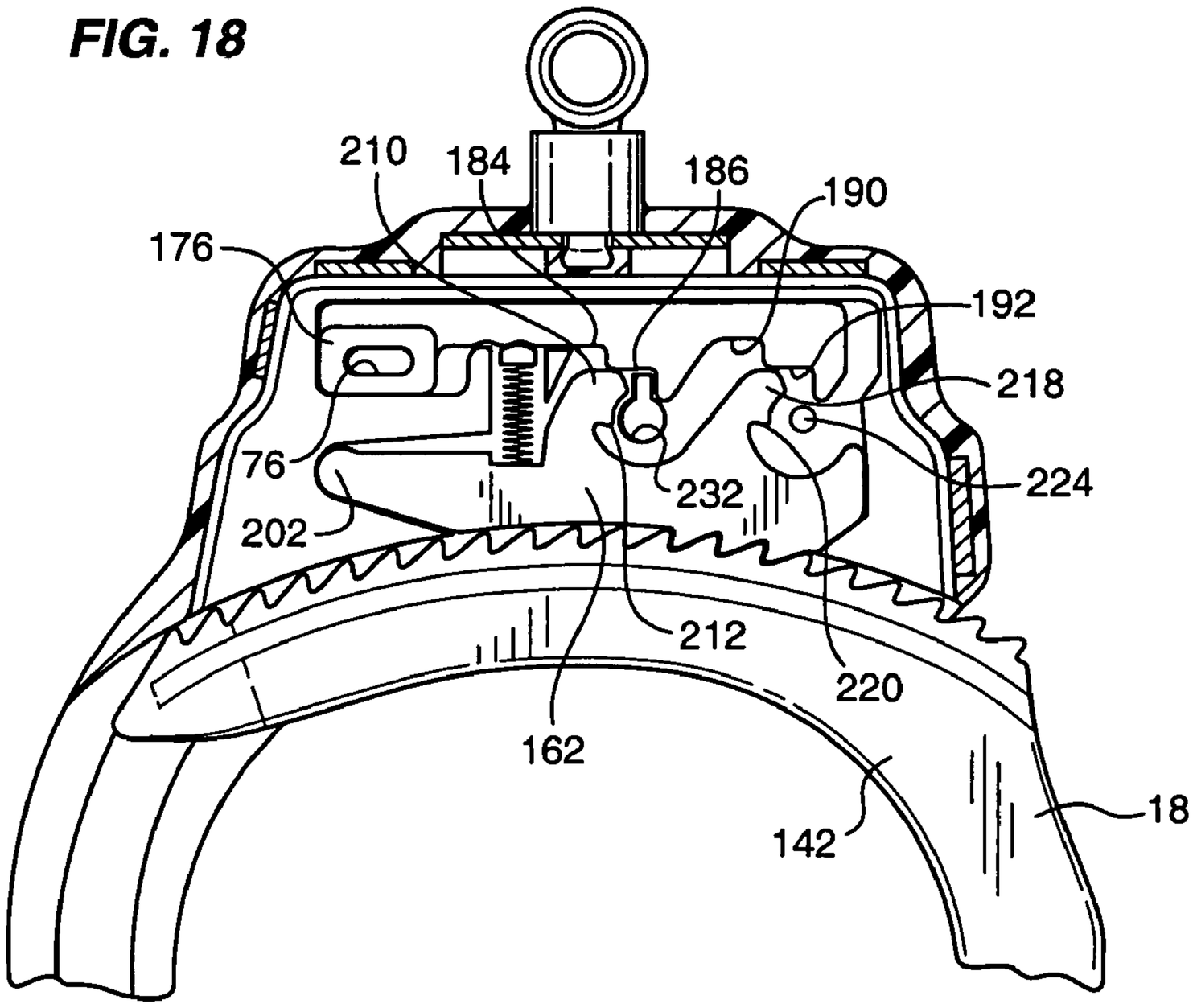
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FIG. 19

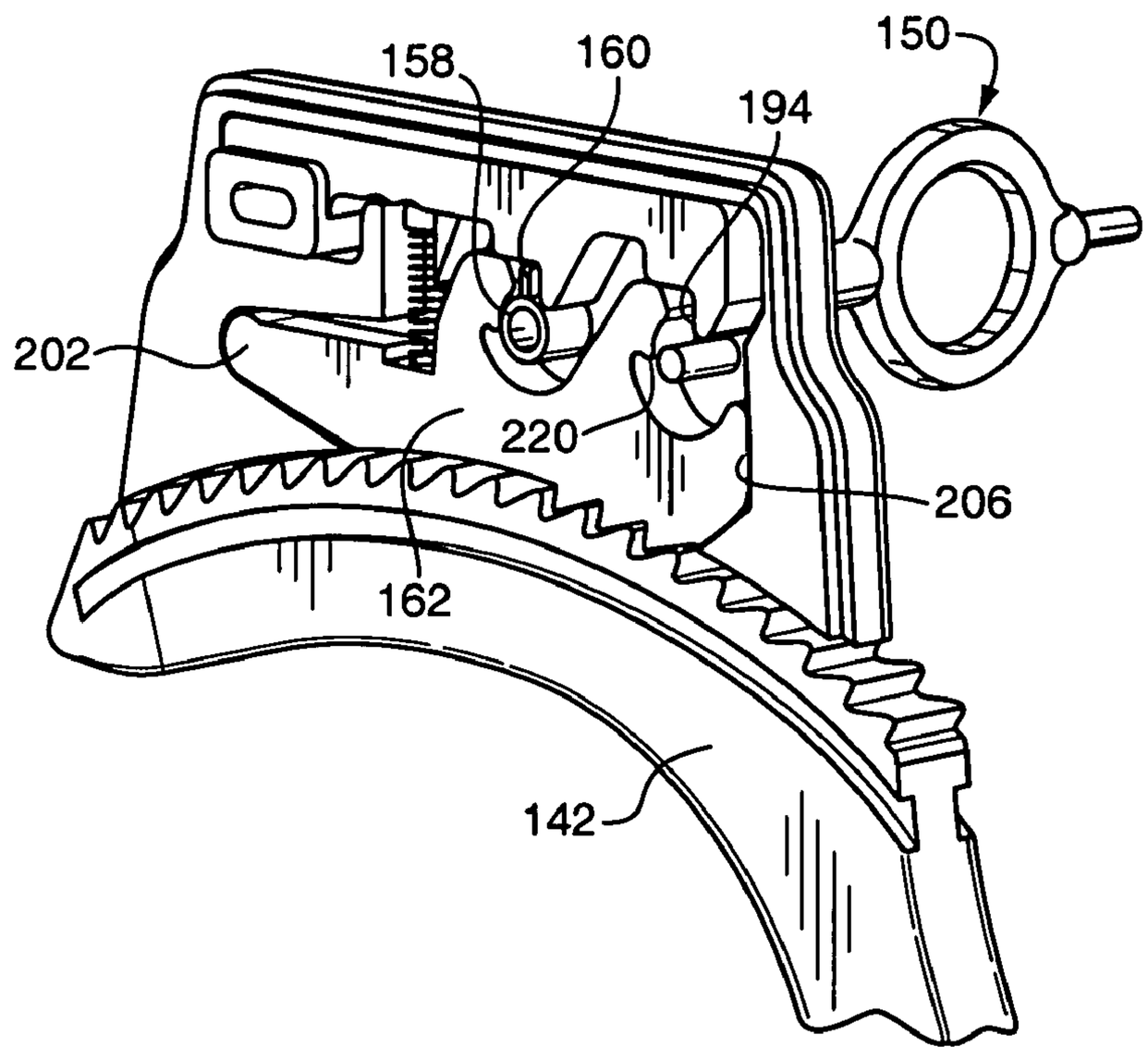
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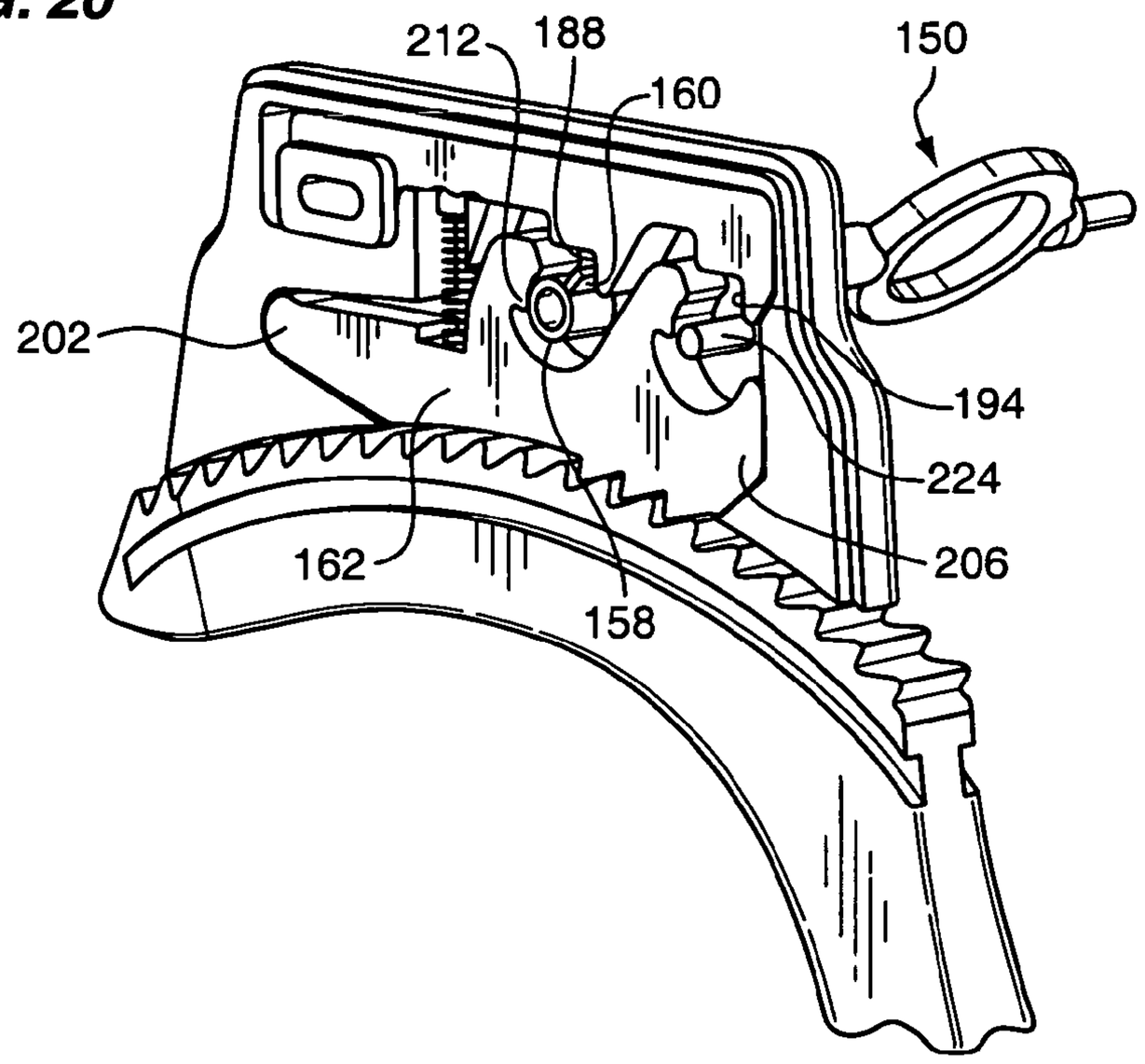
FIG. 20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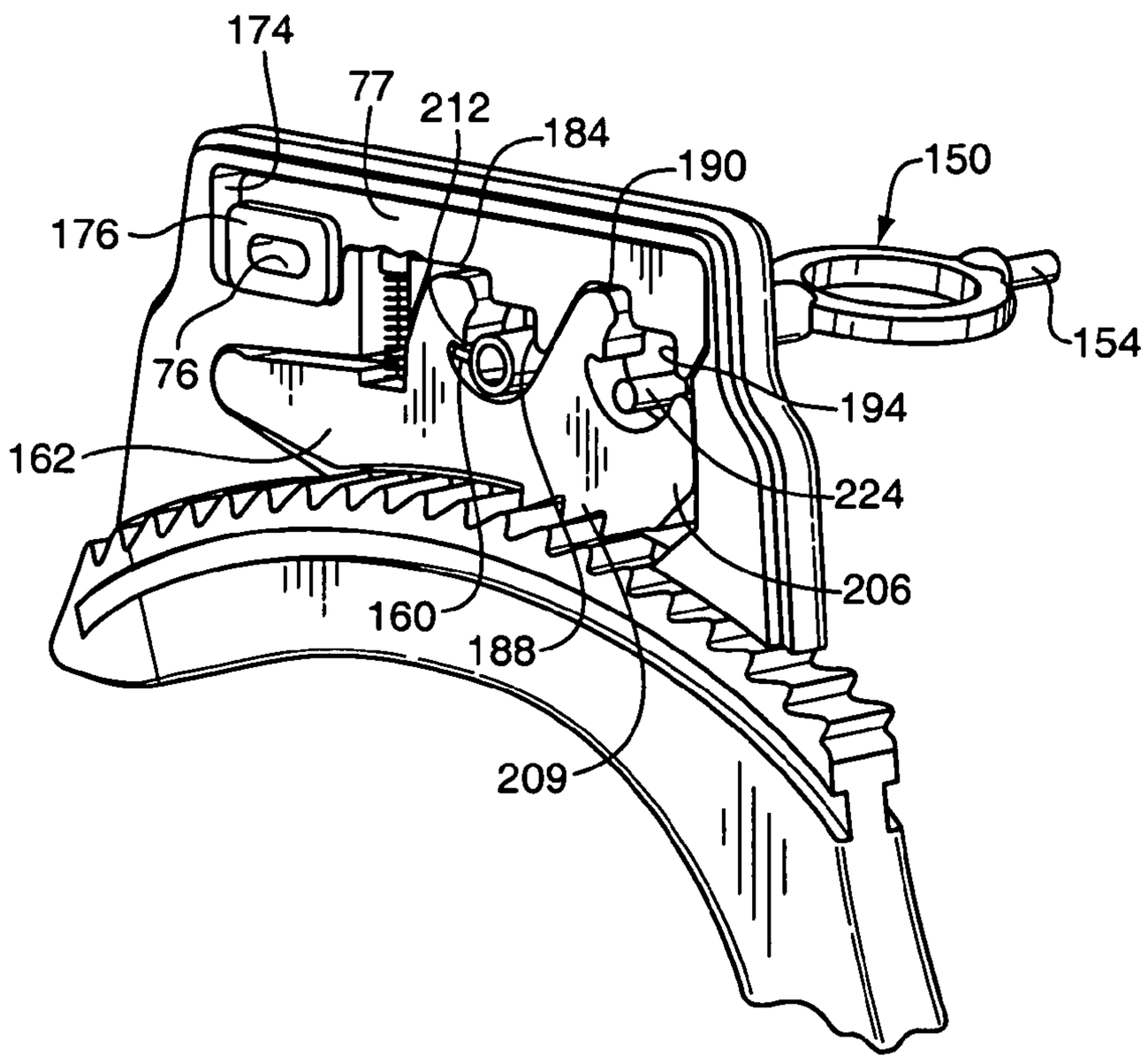
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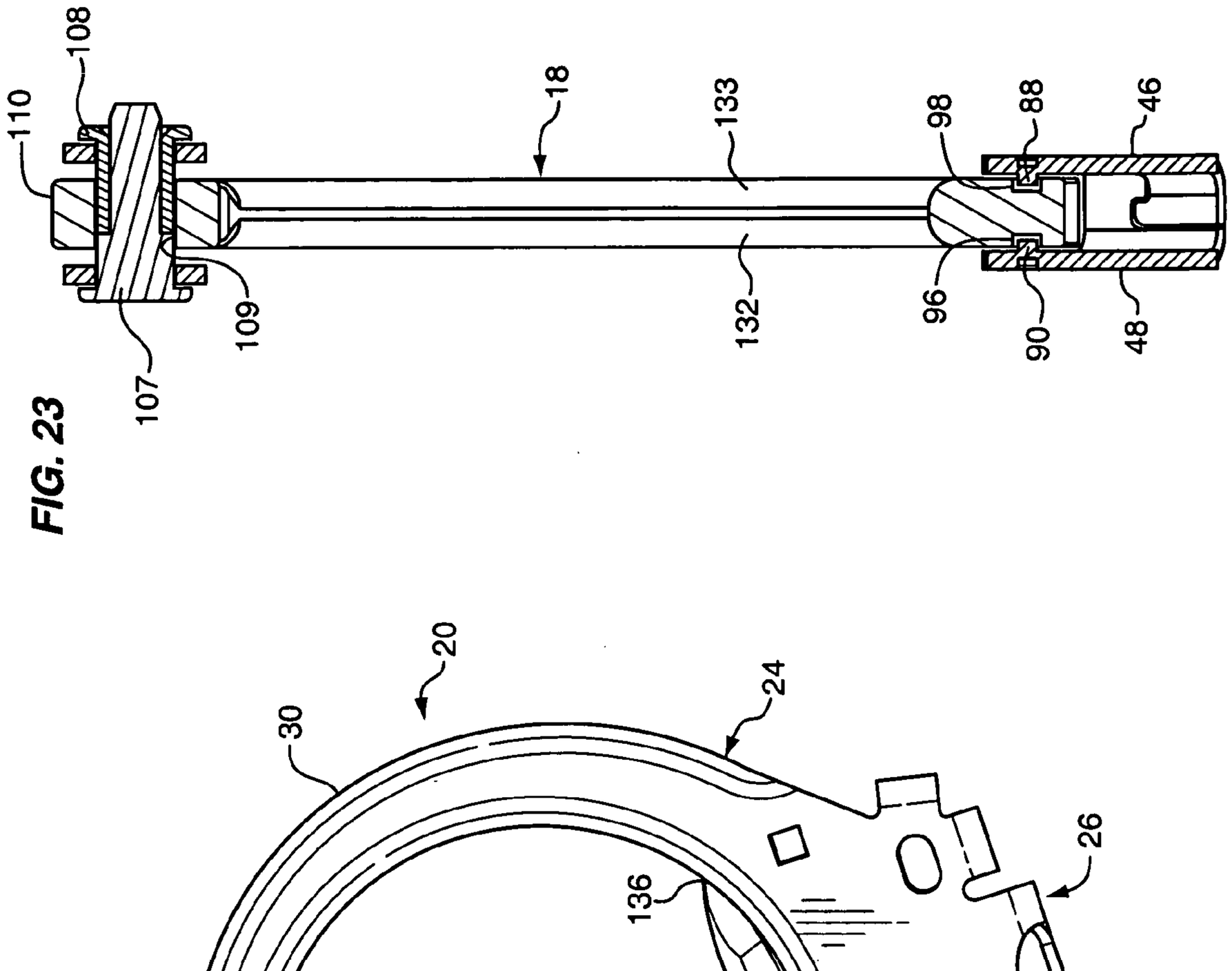
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FIG. 23

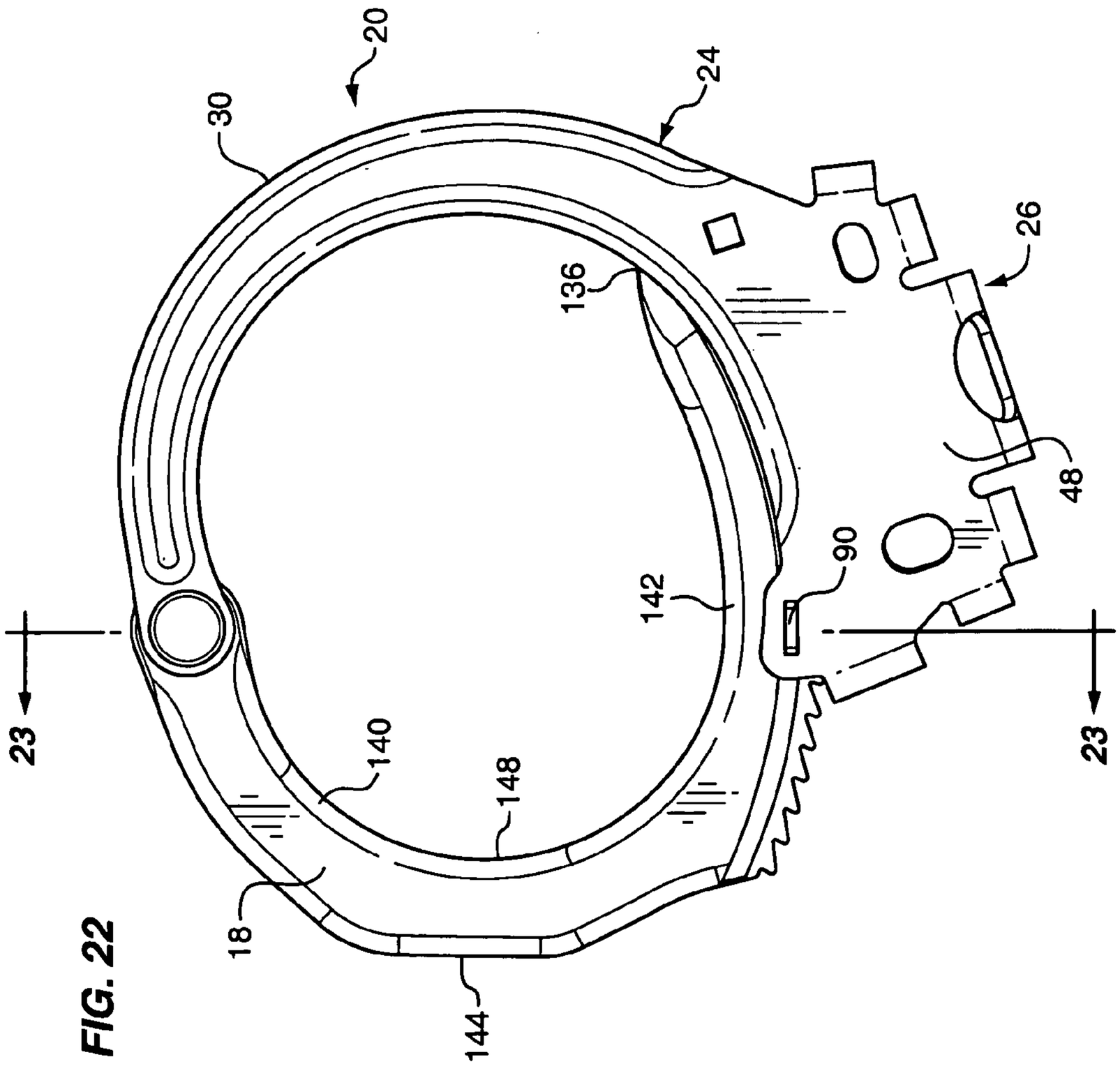
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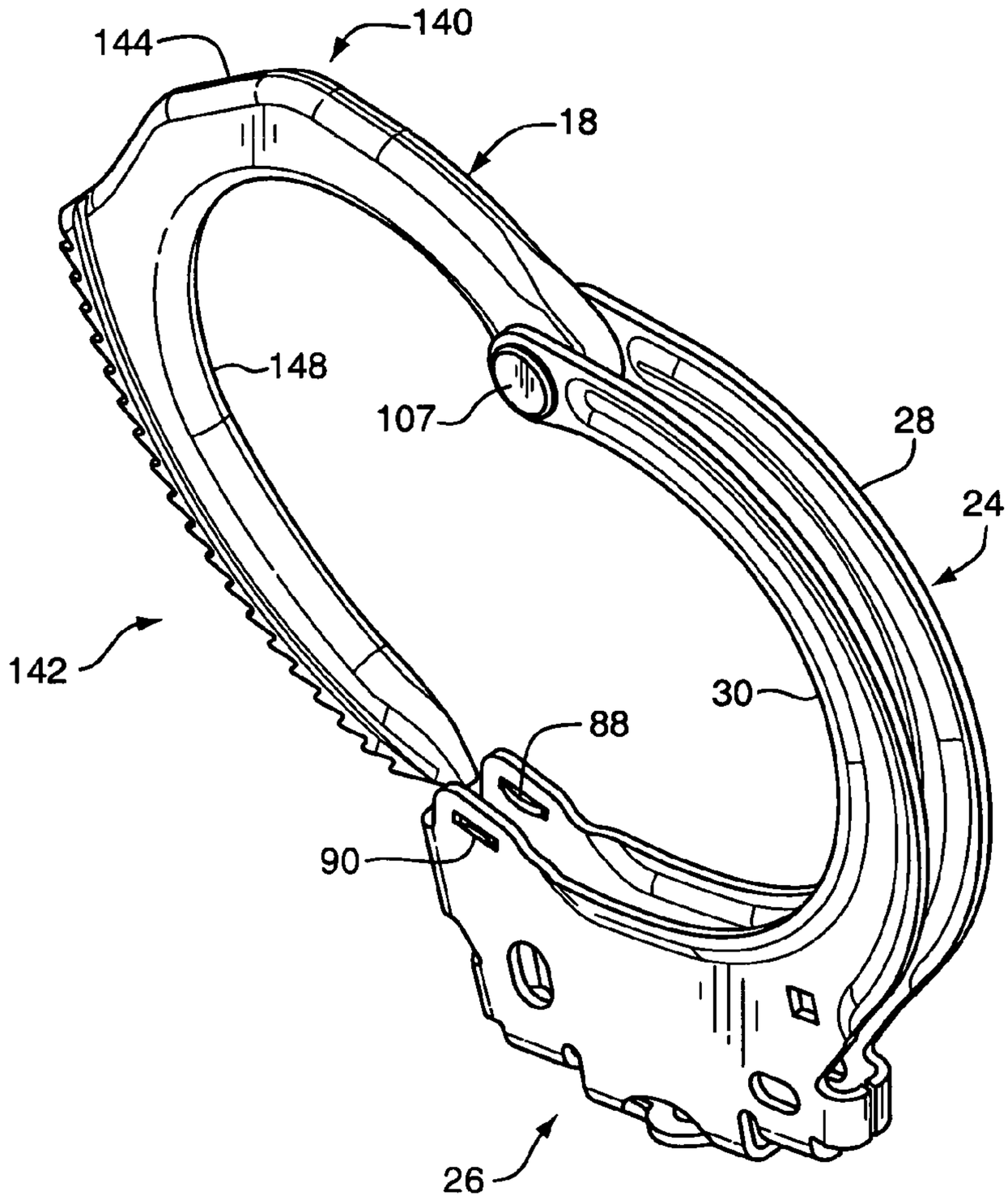
FIG. 22

FIG. 24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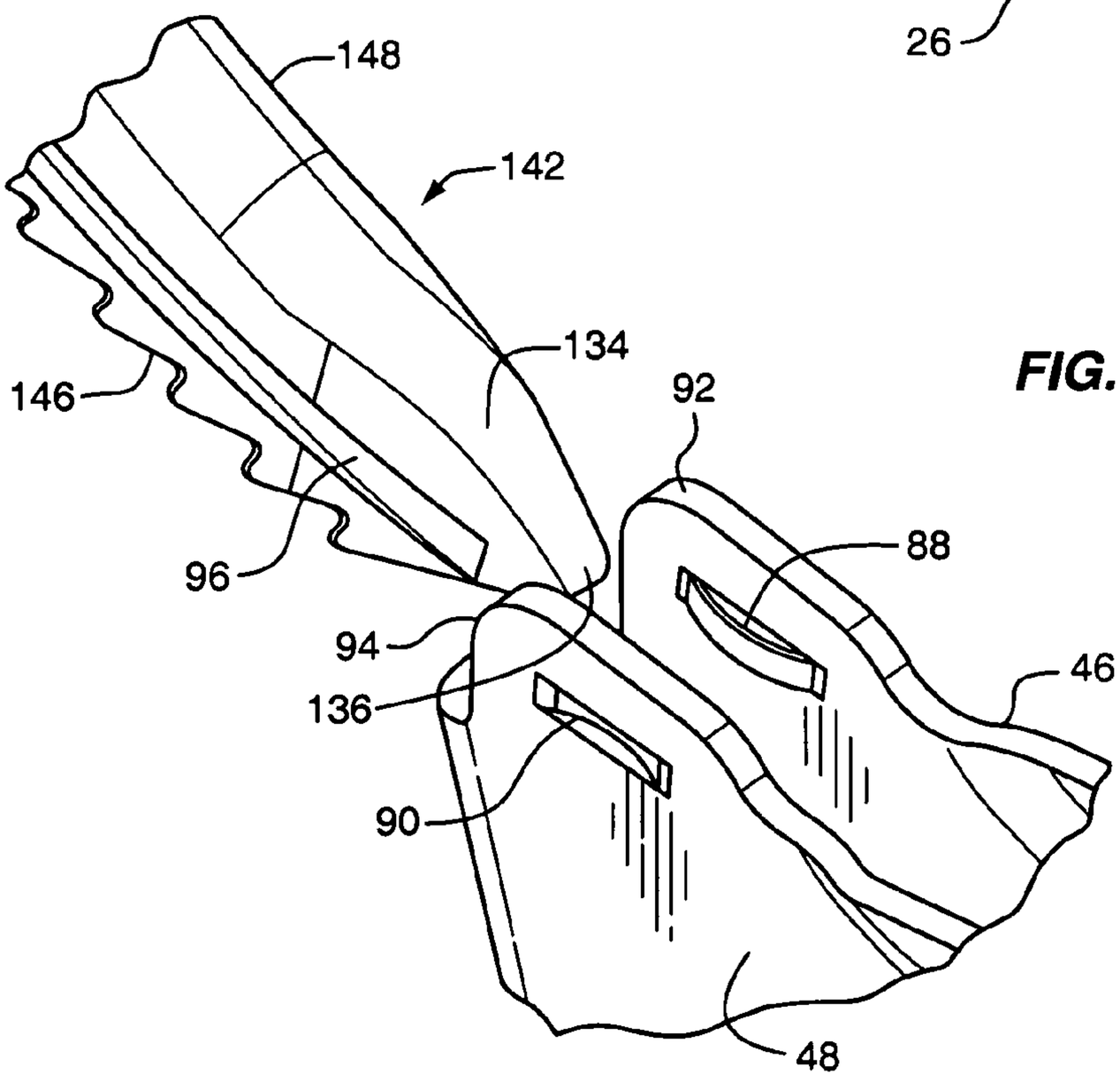
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FIG. 25

TWO PIECE SWIVEL ASSEMBLY FOR HANDCUFF

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an improved set of handcuffs having a number of features, which facilitate their use. These features include, for example, a slightly larger bow for engaging a wrist of a person to be restrained where the envelope of the bow is defined by a conic path with an increasing arc, a rounded inner surface of the bow and cooperating arcuate cheek arms, cheek arms formed from a metal plate and having reinforcing ribs, a molded polymer covering surrounding the cheek arms and providing a round on the inner edge of the cheek arms which engage a wrist, interlocking tabs on the folded cheek arm forming plates, the folded cheek-arm forming plates which are covered by the polymer molding providing a non-riveted base frame and cheek arms, a flat on an outer surface of the bow for lining up a point of contact with a wrist, a removable lockset assembly for locking a pawl relative to ratchet teeth on the bow and including a slideable lock bar, key receiving structure on each side of the lockset assembly for receiving a key and enabling the key to be turned in one direction only for first unlocking a double lock, which prevents movement of the bow in either direction and for secondly, completely unlocking the handcuff by moving the pawl away from the bow and against a spring mechanism, a deflectable detent on a lockset housing for releasably locking the lockset assembly within the base frame of the molded cheek plate assembly, a swivel cup fixed in the base portion of the cheek plate assembly prior to polymer overmolding, and a swivel connected to a welded chain link and having a swivel a pin which is received in the swivel cup.

2. Description of the Related Art

Heretofore, a large number of handcuffs have been proposed. Several prior art U.S. patents disclosing previously proposed handcuffs and features thereof are set forth in the analogous and non-analogous U.S. patents listed below:

U.S. Pat. No.	PATENTEE
4,314,466	Harris
4,574,600	Moffett
5,660,064	Ecker et al.
6,574,998	Kwon
6,672,116	Hilliard

Prior art handcuffs are typically known to be heavy and include a cheek plate assembly made of metal plates which are cut to a desired shape and riveted together such that rivet heads protrude from the sides of the cheek assembly.

In view of the rivet heads protruding form the cheek plate assembly, it is hard to align the cuffs and to fold the cuffs flat.

Also, in many designs of prior art handcuffs, a swivel base for connecting one handcuff to another handcuff protrudes from the cheek plate assembly. Additionally the connector or swivel connected to chain links are fixed in a cheek plate assembly prior to riveting such that if one handcuff is defective after riveting, the whole set, i.e., both handcuffs, have to be discarded.

Further, in prior art handcuffs the lock mechanism is subject to damage such as the breaking off of key posts or pins, chipped teeth, fatigued springs, sticking of double-lock bars, rusting and clogging with debris which require complete replacement of the handcuffs.

Prior art handcuffs typically only have one keyway in the cheek plate assembly such that a user of the handcuffs has to be trained to always have the keyway up for inserting the key.

Also, the handcuff key is rotatable in both rotational directions for two different (locking or unlocking) operations leading to confusion as to which way to turn the key for a desired operation.

Often it is difficult to unlock the handcuffs on the street. Further, difficulty is often incurred in removing the cuffs, particularly, from large subjects.

In currently used handcuffs, the swivel connection to chain links is typically the weakest part of the handcuff when subjected to lateral pressure. Further, the swivel shaft of a two-part swivel often stretches, distorts, and even breaks.

Often times, the cheek plates and/or the bow of the handcuff have edges along the inside of the curved surface of the bow or cheek plates which can cause trauma or injury to a wrist.

Also, the curved envelope of the bow and the curved envelope of the cheek plates in conventional handcuffs often do not properly fit many wrists and sometimes are not large enough or small enough.

As will be described in greater detail hereinafter, the handcuffs of the present invention have high strength and are relatively light weight with an arcuate conic-generated envelope design for the bow and for the cheek plates which provide handcuffs for accommodating a large wrist while at the same time being able to secure small wrists of juveniles and women.

The bow is preferably made of sintered metal powder with rounded inner edges and an outer flat contact surface. It is preferably polymer infused to prevent corrosion and absorption of body fluids, e.g., sweat.

Strength of the bow and cheek plates is maximized by the selection of an optimal combination of materials and heat treatment of the materials as well as design of frame geometry and provision of reinforcing ribs. Also, the use of a die stamped metal plate facilitates forming of a base frame and cheek plate arms of a unitized cheek plate assembly.

Furthermore, the use of a polymer overmold over the cheek plate frame produces a pair of a handcuff with rounded edges, beveled lock slots and beveled keyways. Additionally the polymer can be color coded to indicate the source of the handcuffs.

Finally, punching of track guide forming detents facilitates the forming of bowed or arcuate track guides for being received in track grooves in a toothed track portion.

Also, a unitized, replaceable lockset assembly is provided having a number of features including: a keyway on each side of a lockset assembly housing, a lock slot on each side, a slidable lock bar in side the housing with a locksetting slot aligned with the lock slots, color coding of the lock bar to facilitate locating same for inserting an actuating pin in the locksetting slot to move the lock bar between a single lock position and a double lock position, double locking of the teeth on the bow engaging teeth on a pawl, structure on the pawl and structure on the lock bar enabling a hand cuff key to be rotated in one direction only when inserted in either keyway and rotation in the one direction to move the lockset mechanism from a double lock position, to a single lock position and then to a completely unlock position.

BRIEF SUMMARY OF THE INVENTION

According to one of the teachings of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the bow having rounded inner edges and the bow being made of sintered metal powder.

According to another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the bow having inner rounded edges and having on its outer periphery, a flat contact face for engaging the side of a wrist upon application of the handcuff to a wrist.

According to still another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the bow having a first arcuate portion and a second curved portion including a tooth track portion and the first curved portion and second curved portion having an inside envelope defined by a conic path having an increasing arc so as to form an envelope for receiving various size wrists at different positions of the bow relative to the cheek plates with a minimum of pressure to the wrist.

Also according to another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the bow having a first arcuate portion and a second curved portion including a tooth track portion and the first curved portion and second curved portion having an inside envelope defined by a conic path having an increasing arc so as to form an envelope for receiving various size wrists at different positions of the bow relative to the cheek plates with a minimum of pressure to the wrist.

According to still another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the cheek plate assembly including a unitized metal frame formed from a die stamped metal plate which is folded into the unitized metal frame such that a cheek plate assembly with a flush profile and without projecting rivets is provided.

Further according to still another teaching of the present invention there is provided in a handcuff assembly comprising a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the base frame being folded from a die stamped metal plate which has an opening and a swivel pin having a mounting pin being received in the opening and swaged to fix the swivel cup to the metal plate prior to the formation of the base frame.

Additionally, according to another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the cheek plate assembly including a unitized metal frame formed from a die stamped metal plate which is folded into the cheek plates and the base frame, the base frame including a bottom plate and first and second side plates having interlocking hook formations defining a frame interlock which reinforces the base frame by the juxtaposition of the hook formations.

According to still another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the cheek plate assembly including a unitized metal frame formed from a die stamped metal plate which is folded into the unitized metal frame such that a cheek plate assembly with a flush profile and without projecting rivets is provided and the cheek plate assembly is overmolded with a polymer overmold. Preferably the polymer overmold that is color coded to provide an identification code such as for a security level or a particular law enforcement agency.

Still further according to another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the cheek plate assembly being made of two dissimilar materials.

Also, according to another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the lock mechanism comprising a replaceable lockset assembly mounted in the base frame.

According to still a further teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the lock mechanism comprising a lockset assembly mounted in the base frame and the base frame and the lockset having a keyway on either side thereof for receiving a key inserted from either side of the base frame.

Also according to another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in the lock mechanism comprising a lock bar having a lock setting slot for receiving an actuating pin from either side of the lockset assembly, the pin being moved against one side of the slot for moving the locking bar to a double lock position.

Further according to another teaching of the present invention there is provided in a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement resid-

ing in the lock mechanism comprising a lock bar having a lock setting slot for receiving an actuating pin from either side of the lockset assembly, and the lock bar being color coded so that the lock setting slot can easily be seen through openings in either side of the base frame.

Also according to another teaching of the present invention there is provided a unitized lockset assembly for use in a handcuff assembly and comprising a housing, a slidable lock bar in the housing, a lock bar pawl in the housing and having at least one tooth projecting from the housing, a spring in the housing between the lock bar and the lock bar pawl, and the lock bar and the lock bar pawl having mating structure for blocking movement of the pawl toward the lock bar and for allowing movement of the pawl toward the lock bar depending on the position of the lock bar.

Further according to another teaching of the present invention there is provided a unitized lockset assembly for use in a handcuff assembly and comprising a housing, a slidable lock bar in the housing, a lock bar pawl in the housing and having at least one tooth projecting from the housing, a spring in the housing between the lock bar and the lock bar pawl and the lock bar and the lock bar pawl having mating structure for blocking movement of the pawl toward the lock bar and for allowing movement of the pawl toward the lock bar depending on the position of the lock bar.

Still further according to another teaching of the present invention there is provided a unitized lockset assembly for use in a handcuff assembly and comprising a housing, a slidable lock bar in the housing, a lock bar pawl in the housing and having at least one tooth projecting from the housing, a spring in the housing between the lock bar and the lock bar pawl, the lock bar and the lock bar pawl having mating structure for blocking movement of the pawl toward the lock bar and for allowing movement of the pawl toward the lock bar depending on the position of the lock bar, at least one keyway in the housing, and structure on the pawl and structure on the lock bar which is engageable by a handcuff key inserted into the housing through the keyway and which permit the key to be rotated to move the lock bar from a double lock position to a single lock position.

Additionally, according to another teaching of the present invention there is provided a unitized lockset assembly for use in a handcuff assembly and comprising a housing, a slidable lock bar in the housing, a lock bar pawl in the housing and having at least one tooth projecting from the housing, a spring in the housing between the lock bar and the lock bar pawl, the lock bar and the lock bar pawl having mating structure for blocking movement of the pawl toward the lock bar and for allowing movement of the pawl toward the lock bar depending on the position of the lock bar, at least one keyway in the housing, and structure on the pawl and structure on the lock bar which is engageable by a handcuff key inserted into the housing through the keyway and which permit the key to be rotated in one direction only to move the lock bar from a double lock position to a single lock position and then to move the pawl to a complete unlock position where teeth on the pawl are moved out of engagement with teeth on a bow of a handcuff assembly

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. **1** is a plan view of a pair of handcuffs constructed according to the teachings of the present invention.

FIG. **2** is a plan view of a punched plate, which is folded over to create a pair of cheek plates.

FIG. **3** is a perspective view of a base frame plate portion for the cheek plates before they are folded over to the position shown FIG. **4** and shows a swivel cup about to be positioned in the base frame plate portion.

FIG. **4** is a perspective view of the punched plate shown in FIG. **2** folded over and molded to form a unitized steel frame including the base frame portion and the cheek plates with the swivel cup mounted in the base frame portion.

FIG. **5** is an end view of the unitized steel frame and shows the frame interlock in the base frame portion.

FIG. **6** is a perspective exploded view of one handcuff showing an open position of the bow relative to the encapsulated unitized steel frame and shows a exploded view of a rivet for connecting the bow to the pair of cheek plates and shows two (2) links mounted respectively to swivels each having a pin that is received in the swivel cup;

FIG. **7** is a sectional view through the assembled rivet between the bow and cheek plates prior to swaging.

FIG. **8** is a is a sectional view of the completed rivet after swaging;

FIG. **9** is a sectional view through the swivel cup and pin of the swivel prior to swaging.

FIG. **10** is a sectional view of through the swivel cup after it is swaged to the base frame portion and after it is swaged to the pin of the swivel.

FIG. **11** is an exploded perspective view of the double key lock insert assembly.

FIG. **12** is a plan view of one handcuff showing the bow in an open position relative to the encapsulated cheek plates and base frame portion and shows the double key lock insert assembly about to be inserted into the base frame portion;

FIG. **13** is a perspective view of the encapsulated cheek plates and base frame portion with the double key lock insert assembly partially inserted into the base frame portion.

FIG. **14** is a perspective view similar to FIG. **13** and shows the double key lock insert assembly almost fully inserted into the base frame portion.

FIG. **15** is a perspective view of one handcuff in the closed position and shows two (2) keys positioned on either side of the base frame portion for insertion into the base frame portion for unlocking the handcuff.

FIG. **16** is a perspective view of the tooth track portion of the bow interacting with a double lock bar pawl in the double key lock insert assembly and shows the end portions of two (2) keys inserted from either side of the handcuff positioned to interact with arms of the double lock bar pawl;

FIG. **17** is a plan view of tooth track portion of the bow engaged with the double lock bar pawl and shows a double lock bar in a single locked position where the tooth track portion can be moved or ratcheted forward.

FIG. **18** is a plan view similar to FIG. **17** and shows the double lock bar moved to the double locked position where the tooth track portion of the bow cannot be retracted or ratcheted forward.

FIG. **19** is a fragmentary perspective view of the double lockset assembly showing the locking bar in the double locked position with a key inserted from the other side of the handcuff.

FIG. **20** is a view similar to the view shown in FIG. **19** and shows the key rotated counterclockwise to move the tooth against a shoulder of the double lock bar to move the double lock bar relative to the double lock bar pawl to a pawl ratchet position.

FIG. **21** is a view similar to the view shown in FIG. **20** and shows the tooth of the key rotated further counterclockwise to engage a shoulder on one (1) arm of the double lock bar

pawl for moving the double lock bar pawl completely out of engagement with the tooth track portion of the bow;

FIG. **22** is a plan view of the bow mounted to the cheek plates prior to encapsulation of the unitized steel frame and shows a detent formed in one (1) side of the base frame portion received in a track groove in the tooth track portion.

FIG. **23** is a sectional view through the handcuff shown in FIG. **22**, taken along line **23**—**23** of FIG. **2** and shows detents in each plate of the base frame portion received in track grooves in each side of the tooth track portion of the bow;

FIG. **24** is a perspective view of the bow mounted to the cheek plates prior to encapsulation of the unitized steel frame and shows the tip of the bow and tooth track portion prior to engaging with the detents in the plates of the base frame portion;

FIG. **25** is an enlarged view of the portions broken away of the bow mounted to the cheek plates prior to encapsulation of the unitized steel frame and shows the tip of the bow and tooth track portion prior to engaging with the detents in the plates of the base frame portion.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings in greater detail, there is illustrated in FIG. **1** a set of handcuffs **10** including two cuffs **12** linked together by two chain links **14** and **16**. Each cuff **12** comprises a bow **18**, pivotally connected to a molded cheek plate assembly **20**.

FIG. **2** illustrates a die stamped, stainless steel, metal plate **22** which is folded, bent or formed into a cheek plate frame assembly **24** including a base frame **26** and parallel spaced cheek arms **28** and **30**.as shown in FIGS. **4** and **5**.

In the figures, it will be understood that, for the sake of clarity and illustration, in some places the cheek plate frame assembly **24** is illustrated instead of the overmolded cheek plate assembly **20**, which is the cheek plate frame assembly having a plastic overmold thereon.

The die stamped plate **22** includes a central base frame forming section **32** and first and second cheek arms or cheek arm plates **28** and **30** which form the cheek plate frame assembly **24** shown in FIGS. **4** and **5**. A reinforcing rib **34** or **36** is stamped in each cheek arm plate **28**, **30** and a hole **38** or **40** is punched in an outer end **42** or **44** of each cheek arm plate **28**, **30** for facilitating pivotal mounting of the bow **18** to and between the cheek arms **28** and **30**.

The central base forming section **32** of the die stamped metal plate **22** is specially configured as shown so that when side plates **46** and **48** are folded about phantom lines **50** and **52** to form bottom plate **53**, end tabs **54** and **56** are folded inwardly, bottom tabs **58**, **60**, **62** and **64** are folded inwardly, front tabs **66** and **68** are folded inwardly and hook formations **70** and **72** are folded inwardly, as shown in FIGS. **4** and **5**, the unitary base frame **26** is formed with a strong a frame interlock **73** formed by the interlocking hook formations **70** and **72**.

The base frame forming portion **32** further includes two oval-shaped holes **74** and **75** punched therein which, when portions of the base frame forming portion **32** are folded will form aligned, opposed double-lock slots **74** and **75** for mating with a locksetting slot **76** in a double lock bar **77** in a lockset assembly **78** described in greater detail hereinafter in connection with the description of FIGS. **11** and **16**–**21**.

Further, a center opening **79** is provided in the bottom plate **53** for receiving a mounting pin **80** of a swivel cup **82** (FIG. **3**) in the bottom plate **53** of the base frame **26** prior to folding and bending of the plate **22** and prior to polymer overmolding.

Axially spaced a part keyway forming openings **84** and **86** are also formed in the die stamped metal plate **22**, namely in the side plates **46** and **48** on either side of the bottom plate **53**, such that a key can be inserted through either one of these keyway forming openings **84**, **86** from either side of the base frame **26**.

Also, two detents or track guides **88** and **90** are punched into the side plates **46** and **48** adjacent a corner **92** or **94** of the side plate **46** or **48** for being received in a track groove **96** or **98** (FIG. **23**) in the bow **18**.

Finally, a latch hole or notch **100** is provided in one of the side plates **46**, **48**, in the illustrated embodiment in side plate **48**, for receiving a flexible detent **102** in/on a cover **103** for a housing shell **104** for a housing **105** of the lockset assembly **78** (FIG. **11**) for latching the lockset assembly **78** in the base frame **26** while permitting removal of the lockset assembly **78** from the base frame **26**.

FIG. **3** is a perspective view of the base plate forming portion **32** and shows the swivel cup **82** positioned to be mounted to the bottom plate **53**.

The cheek plate frame assembly **24**, before polymer overmolding of the frame assembly **24** with a plastic polymer overmold **106** (FIG. **9**), is shown in FIGS. **4** and **5**.

In FIG. **6** is illustrated a perspective view of an open cuff **12** showing a stainless steel pivot pin **107** and a stainless steel pivot bushing **108** positioned for insertion through holes **38** and **40** in the cheek arms **28** and **30** and a hole **109** (FIG. **7**) in a base end **110** (FIG. **7**) of the bow **18**. The pin **107** is swaged, staked or riveted in place as show at **111** in FIG. **8**.

Also shown is a swivel pin **112** of a swivel **114** mounted by a swivel eyelet **116** on the chain link **14** positioned for insertion into the swivel cup **82**.

With reference to FIGS. **9** and **10**, typically the swivel cup **82** is mounted to the die stamped metal plate **22** before it is folded and bent to form the base frame **26** and the cheek plate frame assembly **24** shown in FIGS. **4** and **5** and before polymer overmolding of the frame assembly **24**. In this way, if the overmold is defective, only the defective overmolded frame assembly **24** and one swivel cup **82** needs to be discarded and not a whole set of handcuffs **10**. Subsequently, an outer end **118** (FIG. **9**) of the mounting pin **80** of the swivel cup **82** is swaged as shown at **120** in FIG. **10**. Preferably, the mounting pin **80** is swaged prior to the folding and bending of the portions of the stamped die plate **22** and before the plastic overmold **106** is placed on the cheek plate frame assembly **24**.

In one preferred embodiment, the mounting pin **80** is swaged before the overmolding of the frame assembly **24** with the plastic overmold **106** (FIGS. **9** and **10**), although the mounting pin **80** is shown (incorrectly) unswaged in FIG. **9**.

Typically, the swivel cup **82** is gripped outside a mold and liquid plastic is placed in the mold and around the frame assembly **24**. The closing of the center opening **79** in the bottom plate **53** with the swaged mounting pin **82** serves to limit flow of the liquid plastic during overmolding and liquid plastic flow is blocked by the swivel cup **82**. The plastic can be colored to indicate a level of the security officer having the handcuffs **10** or for indicating the source of the cuffs **10** or branch of service or agency, e.g., army, navy, FBI, city police, state police or sheriffs police using the cuffs **10**.

The eyelet portion **116** of the swivel **114** is first received on the chain link **14** or **16** and then the swivel pin **112** is received in the swivel cup **82** as shown in FIG. **9**. Here it will

be seen that the swivel pin **112** includes a reduced in diameter neck portion **122** between the eyelet **116** and an end portion **124** of the swivel pin **112**. It will also be seen that the swivel cup **82** has an annular rib **126** on an inner wall **128** of the swivel cup **82** which is aligned with the reduced in diameter neck portion **122** of the swivel pin **112** as shown in FIG. **9**.

Then, the swivel cup **82**, which is initially larger at the outer end **130** as shown in FIG. **9** is swaged to fix the annular rib **126** adjacent the reduced in diameter neck portion **122** of the swivel pin **82**. The elasticity of the metal of the swivel cup **82** is such that although the annular rib **126** bottoms on the reduced in diameter neck portion **122** during the swaging operation, the annular rib **126** will spring back a small amount from its bottomed out position against the reduced in diameter neck portion **122**. As a result, a low friction bearing type relationship is established between the swivel pin **112** and the swaged swivel cup **82** thereby to enable the swivel pin **112** to swivel easily with respect to the swivel cup **82**, much like a shaft in a bearing.

The cheek arms **28** and **30** are positioned to be parallel spaced from each other as shown. Then, the side plates **46** and **48** and bottom plate **53**, as well as the cheek arms **28** and **30** are covered with the plastic overmold **106** to provide the cheek plate assembly **20** with rounded edges and corners. Also the double lock slots **74** and **75** are beveled as a result of the plastic overmold as are keyways **124** and **126** formed in openings **84** and **86** in side plates **46** and **48**.

It should be noted, that the plastic overmold **106** enables the cheek plate assembly **20** to have curved, rounded, or beveled edges which will minimize injury to a wrist from the cheek plate assembly **20**. Further, the plastic overmolding allows the double-lock slots **74**, **75** and the keyway openings **84**, **86** (**124**, **126**) to be beveled on each side of the base frame **26**.

The bow **18** is preferably formed from stainless steel powder which is sintered, i.e., first, subjected to pressure in a mold and second, subjected to heat. Just prior to application of high pressure, some of the metal powder is removed so that rounded edges of 0.040–0,120 inch can be formed, preferably about 0.080 inch. In this way, the bow **18** is made with rounded inner edges **132** and **133** best shown in FIG. **23** for presenting minimal trauma to the wrist of a person being restrained. An inner or base end **110** is formed with the hole **109** and an outer end **134** is tapered and has a blunt point **136** as shown in FIG. **25**.

Referring to FIG. **12**, the bow **18** includes a first arcuate or curved portion **140** and a second arcuate or curved portion **142** defining a tooth track portion. The first arcuate portion **140** includes the base end **110** with hole **109** therein and has an outer, high contact, flat face **144** which is designed to be applied against the edge of a wrist for pushing the bow **18** through the cheek plate assembly **20** and come full circle about the pivot pin **107** and about a wrist. The second arcuate portion **142** defines a tooth track portion **142** and has spaced, wide, deep set, ratchet teeth **146** formed on an outer side thereof. The tooth track portion **142** is also formed with the arcuate track grooves **96** and **98** on either side thereof.

Further, the bow **18** is polymer infused to inhibit, if not altogether prevent rust or corrosion of the bow **18** and to inhibit, if not to altogether prevent, absorption of body fluids from the wrist of a person being restrained into the bow **18**.

Additionally, and according to one of the teachings of the present invention, the envelope formed on an inner edge surface **148** of the bow starting from the base end **110** and extending to the pointed outer end **136** of the bow **18** is formed according to a conic path having an increasing arc so as to form an envelope adapted to receive various sized wrists at different positions of the bow **18** relative to the cheek plates or arms **28**, **30** of the cheek plate assembly **20** and with a minimum of pressure applied to the wrist. Stated otherwise the conic path of the surface **148** is a curve generated by a projection of a portion of a conic onto a flat plane. The software for generating the design of this conic path is sold by Parametric Technologies Corporation of Needham, Mass. under their trademark, Pro/ENGINEER 3-D.

The conic path can be defined as follows:

Imagine taking a "string" and curling it around a cone starting from the top of a cone and going to the bottom of the cone. This establishes a conic path. Then the lower portion of that conic path is projected onto a plane and by trial and error, i.e. by adjusting the slope of the "string" and/or the angle at the apex of the cone, a conic path can be created empirically which closest approximates the human wrist for both a large wrist and for a small wrist. In this way, the envelope of the inner surface **148** formed when the bow **18** is engaged about a wrist and of the cheek arms **28**, **30** extending about a wrist provide a close approximation to the envelope of the wrist and is slightly larger than the envelope of a prior art handcuff. It will be under stood that the envelope of the cheek arm plates **28** and **30** through the base frame **26** to the corners **92** and **94** of the unitized base frame **26** follows a similar conic path. The largest area created by the bow **18** and cheek plate assembly **20** when a first tooth **106** engages a tooth **209** in the lockset assembly **78** is about 5.67 square inches and the smallest area created when a last tooth **146** engages a tooth **209** in the lockset assembly **78** is about 2.8 square inches.

Again, it will be understood that the envelope of the inner edges of the cheek plate arms **28**, **30** going from the outer ends **42** and **44** having the pivot pin mounting holes **38** and **40** to the entry point of the bowl **8** between the corners **92** and **94** of the base frame **26**, also follows a similar or the same conic path having an increasing arc.

Referring now to FIG. **11**, there is illustrated therein the components of the replaceable lockset assembly **78** constructed according to one of the teachings of the present invention.

The lockset assembly **78** shown in FIGS. **11** and **16–21** is constructed for use with conventional handcuff key **150** as shown in FIG. **15**. Such a key **150** includes a ring-shaped handle **152** having a short actuating end pin **154** extending rearwardly therefrom and a shaft **156** extending forwardly therefrom to an outer, hollow cylindrical end **158**. On the other surface of the outer cylindrical end **158** is a single, generally rectangularly shaped, tooth **160**. This key **150** is generally standard for use in opening handcuffs and is adapted to be inserted into a keyway in a handcuff and rotated to lock and unlock the handcuff.

The rearwardly extending pin **154** is used to set the position of a double lock bar **77** in a lockset assembly, as will be explained in greater detail hereinafter.

Referring again to FIG. **11**, the lockset assembly **78** includes the housing **105** (which is shown exploded in two parts in FIG. **11**) that includes the housing shell **104** and the housing cover **103**. Inside the housing **105**, there is positioned the double lock bar **77**, a double lock bar pawl **162**, a lock spring **164** and spring tip **166**.

The housing shell **104** includes an upper cavity portion **170** and a lower cavity portion **172**. The upper cavity portion **170** includes a rounded, generally rectangular shaped section **174** for receiving a generally rectangular-shaped block end **176** of the double lock bar **77**. The rectangular-shaped

block end **176** has the generally oval lock setting slot **76** extending therethrough for receiving the short actuating pin **154** on the key **150** from either side of the lockset assembly **78**. The pin is moved laterally in the slot **76** to move the end **176** and thereby the double lock bar **77** between a single lock position and a double lock position described in greater detail hereinafter.

The double lock bar **77** further includes a bar portion **178** that extends from the generally rectangular shaped end **176** to an opposite end **180**—of the double lock bar **77**. An upper side surface **182** and a side surface (hidden from view) of the bar portion **178** are smooth for facilitating sliding movement adjacent wall surfaces of the housing shell **104**. Preferably the double lock bar is made of plastic and colored, e.g., with the color red or white, so that the end **176** with slot **76** easily can be seen through the double lock slots **74** and **75** in the base frame **26**.

Then, on the lower side of the double lock bar **77** and spaced a short distance from the generally rectangular end **176**, there is provided a first space or cavity area **184**, then a first step or land **186** followed by a first shoulder **188** going in a direction toward the end **180**. Continuing toward the end **180** there is next provided a second space or cavity area **190**, a second step or land **192** and a second shoulder **194** adjacent the end **180** of the double lock bar **77**.

The lock spring tip **166** has an upper wedge shape tip which is movable between two depressions **198** and **199**, located in the lower side of the double lock bar **77** between the rectangular block end **176** and the first space or cavity area **184**, when the double lock bar **77** is moved between a single lock position (FIG. **17**) and a double lock position (FIG. **18**) to latch releasably the double lock bar **77** in either position. When the double lock bar **77** is moved between the two lock positions by an actuating pin in one direction or by a key in the other direction, the spring **164** is compressed slightly as the wedge shape tip snap-fittingly moves between the depressions **198** and **199**.

The lower cavity portion **172** of the housing shell **104** has a rounded V-shaped cavity portion **200** into which a rounded end **202** of the double lock bar pawl **162** extends. This end **202** is rounded for pivoting on a rounded end wall **204** of the rounded V-shaped cavity portion **200**. An opposite end **206** of the double lock bar pawl **162** is shaped to fit within the lower cavity portion **172** and is arranged for swinging movement within the lower cavity portion **172** about the opposite pivot end **202** of the double lock bar pawl **162**.

An outer side **205** of the pawl **162** has a plurality of, typically three, teeth **209** which are constructed, sized and arranged to be received between and mesh with the teeth **146** on the outside of the tooth track portion **142** of the bow **18**. On the other or inner side **207** of the double lock bar pawl **162** is a notch **208** for receiving the lock spring **164**. The notch **208** is spaced from the rounded end **202**. Then, extending from the inner side **207** of the pawl **162** and toward the lock bar **77** is a first leg **210** which, when the double lock bar **77** is positioned to the right as shown in FIG. **21**, is positioned opposite the first space or cavity **184** in the double lock bar **77**. When the double lock bar **77** is positioned to the left as shown in FIG. **18**, the first leg **210** is positioned opposite to and adjacent the first step or land **184** on the double lock bar **77**. The first leg has a block end and a curved side that extends to a first ledge **212** that faces back toward the bow **18**. Then, a first actuate surface **216** extends from the first ledge **212** in an arcuate path to a second leg **218** which extends away from the inner side **207** of the pawl **162** and toward the double lock bar **77**. This second leg **218** also has a block end and a curved side which extends to a second ledge **220**. Extending from the second ledge **220** is a second arcuate surface **222** that extends in an arcuate path to the end **206**. The first arcuate surface **216** and the second arcuate surface **222** are adapted to interact with the tooth **160** on the key **150** when the key **150** is inserted into the lockset assembly **76** as will be described in greater detail hereinafter.

As shown in FIG. **11**, the housing shell **104** has a pin **224** extending from an inner wall surface **226** that extends along a first axis in line with a keyway **228** in the housing cover **103**. Then, parallel spaced to this pin **224** is another pin **230** that extends from an inner wall surface of the housing cover **103** toward the housing shell **104** along a second axis which is aligned with a keyway **232** in the wall of the housing shell **104**. The keyways **228** and **232** are arranged to be aligned with the keyways **126** and **124** in the overmold on the side plates **48** and **46** of the base frame **26**.

It will be understood that the key **150** can be inserted through either keyway **232** or **228** with the hollow circular end **158** of the key **150** then being received over the pin **230** or the pin **224** and with the tooth **160** positioned adjacent the first arcuate surface **216** or second arcuate surface **222** of the double lock bar pawl **162**.

A double lock slot **233** is provided in the wall of the housing cover **103** in line with the generally rectangular rounded cavity **174** in the housing shell **104**. The housing shell is provided with a similar double lock slot **234**. Both double lock slots **233** and **234** are in line with the rectangular end **176** and with the double lock slots **74** and **75** in the side plates **46** and **48** of the base frame **26**. The aligned slots **74**, **233**, **234** and **75** permit the actuating pin **154** on the key **150** to be inserted from either side of the base frame **26** into the lockset assembly **78** for engaging one side of the locksetting slot **76** in the double lock bar **77** for moving the double lock bar **77** from a single lock position to a double lock position as will be described in greater detail hereinafter.

Referring now to FIG. **12**, it will be seen that the assembled lockset assembly **78** is pivotally inserted into the hollow interior of the base frame **26** and rotated into and moved linearly into the hollow interior of the base frame **26** until the deflectable detent **102** is snap fittingly received into the latching notch **100** in the side plate **48** of the base frame **26**. The progressive movement of the lockset assembly **78** into the base frame **26** is shown in FIGS. **13** and **14**.

FIG. **16** is a perspective view of the inside of the lockset assembly **78** with the tooth track portion **142** of the bow **18** adjacent the lockset assembly **78**. Here the double lock bar **77** is shown moved to the single lock position. Also, the tooth **160** of either key **150** is shown rotated against the first ledge **212** of the first leg **210** of the pawl **162** or against the second ledge **220** of the second leg **218** of the pawl **162**. Note that with the double lock bar **77** in the single lock position, the block ends of the first and second legs **210** and **218** can move into the first and second spaces/cavities **186**, **190**, respectively by the engagement of the tooth **160** with the ledge **212** or **220** to move the pawl **162** completely out of engagement with the tooth track portion **142** of the tooth track portion of the bow **18**. This is the fully unlocked position.

FIG. **17** shows the double lock bar **77** in the single lock position similar to the position shown in FIG. **16**, but without a key **150** rotated to a completely unlock position. Here the teeth **146** on the tooth track portion **142** of the bow **18** can ratchet forwardly (to the left) but nor rearwardly (to the right).

In FIG. **18** is shown a double lock position of the double lock bar **77** where the block end of the first leg **210** of the pawl **162** is adjacent the first land or step **186** which prevents

movement of the pawl **162** away from the bow **18**. This prevents forward movement of the tooth track portion **142** of the bow. Such forward movement of the tooth track portion **142** is also prevented by the juxtaposition of the block end of the second leg **218** adjacent the second land or step **190** on the double lock bar **77**.

The double lock also can be unlocked with insertion of the key **150** into one of the keyways **232** or **228** in the housing **105**. Note that when a key end **158** is inserted into the keyway **232** shown in FIG. **18** or **19**, and over the pin **230**, the tooth **160** can only be rotated against the first shoulder **188** to move the double lock bar **77** from the double lock position to the single lock position. An attempt to rotate the key **150** in the opposite rotational direction is blocked by the first leg **210** of the pawl **162** which cannot be moved to the left by reason of the rounded end **202** of the pawl **162** bearing against the rounded wall **204**. The same result is obtained when a tooth **160** is positioned between the second shoulder **194** of the double lock bar **77** and the second leg **218** of the pawl **162**. Thus an end **158** of a key **150** inserted through either keyway **232** or **228** can only be rotated in one rotational direction and this results in the tooth **160** first engaging the shoulder **188** or **194** on the double lock bar **77** to move it to the single lock position. Further rotation of the key end **158** results in a sweep of the tooth **160** adjacent the first or second arcuate surface **216** or **222** on the pawl **162** until the tooth **160** engages the first or second ledge **212** or **220** on the first or second leg **210** or **218** to move the legs **210** and **218** into the spaces **184** and **190** to completely disengage the teeth **209** on the pawl **162** from the teeth **146** on the tooth track portion **142** of the bow **18** as shown in FIGS. **16** and **21**.

Whenever the lockset assembly **78** cease to function properly, It will be understood that the lockset assembly **78** can be disengaged from its position within the hollow interior of the base frame **26** by inserting a tool (such as an awl or screwdriver) into the base frame **26** from a position outside of and into and between the cheek arms **28** and **30** and at the same time depress the deflectable detent **102** out of the latching notch **100** and into a recess **240** for this purpose formed in the inner wall surface **226** of the housing shell **104** and pry the lockset assembly **78** out of the base frame **26** to replace the same. This will be done in steps starting with the position of the lockset assembly **78** inside the base frame **26** and then going to the position shown in FIG. **14** and then the position shown in FIG. **13** and then finally to the fully released position shown in FIG. **12**.

FIG. **15** illustrates another important feature of the handcuffs **10** of the present invention, namely the ability to insert a key **150** from either side of the handcuff **12** into the base frame **26** for engagement with the double lock bar **77** and pawl **162** inside the lockset assembly **78**.

Starting with FIG. **19**, which is a perspective view of the locking mechanism inside the lockset assembly **78** shown in FIG. **18**, the key **150** is rotated as shown in FIG. **20**. This results in the tooth **160** engaging the first shoulder **188** on the double lock bar **77**. It will be understood that a key **150** inserted from the other side of the base frame **26** and rotated clockwise will result in the tooth **160** engaging the second shoulder **194** on the double lock bar **77**.

Then, as shown in FIG. **21** (and also in FIG. **16**), continued rotation of the key **150** will bring the tooth **160** into engagement with the first or second arcuate surfaces **216** or **222** until the tooth **160** engages the first ledge **212** on the first leg **210** or the second ledge **220** on the second leg **218** where the first leg **210** and the second leg **218** are urged toward the spaces **184** and **190** on the double lock bar **77** and at the same time urges the teeth **209** out of engagement with the teeth **146** on the tooth track portion **142** of the bow **18**, as best shown in FIGS. **21** and **16**.

Referring now to FIGS. **22–25**, and particularly to FIG. **22**, it will be seen that the detents **88** and **90** are located on tangents to a curve of an arc that is generated on a radius between the center of the pivot pin **107** and the center of each detent **88** or **90**. As a result, when the bow **18** is rotated counterclockwise in the view of same shown in FIG. **22**, the tooth track portion **142** will move smoothly through the cheek plate assembly **20** with the track guides **88**, **90** formed by the detents **88**, **90** passing through the track groove **96** or **98** on either side of the bow **18**.

As best shown in FIGS. **24** and **25**, the track guides or detents **88**, **90** have a rounded configuration for facilitating engagement with the track grooves **96**, **98** and facilitate guiding of the bow **18** between the side plates **46** and **48** of the base frame **26** and thereby through and between the cheek plate arms **28** and **30**.

In FIGS. **22–25**, the unitized frame assembly is shown prior to encapsulation to better illustrate the relationship between the track grooves **96**, **98** in the tooth track portion **142** of the bow **18** and the detents or track guides **88**, **90**. In FIG. **23** it will be seen that the track guide forming detents **88** and **90** are pushed out of the respective side plates **46** and **48** (into the space between the side plates **46** and **48**) and form curved rails that have an outer curved surface which are received in the track grooves **96** and **98**. Also the rails have a high lateral strength for holding the bow **18** when a test tension force is applied to the handcuff **12** which tends to pull the cheek plates **28**, **30** away from the bow in the base frame **26**.

From the foregoing description, it will be understood that the pair of handcuffs **10** of the present invention and the individual handcuffs **12** thereof have a number of advantageous features some of which have been described above and others of which are inherent in the invention. In particular, the set of handcuffs **10** include a bow **18** slightly larger than a prior art bow and arcuate cheek arms slightly larger than prior art cheek arms for engaging wrists of a person to be restrained.

Further, the edges of the actuate cheek arms and of the bow are rounded on the inner surface thereof to minimize trauma to a wrist. The cheek plate assembly is formed from a die stamped metal plate which is folded and bent and includes a frame inner lock as well as reinforcing ribs in the cheek arms which enhance the strength of the cheek plate assembly.

The method for making the cheek plate assembly **20** by first stamping the metal plate **22** with a center hole **79**, inserting the mounting pin **80** of the swivel cup **82** in the center hole **79**, swaging the mounting pin **80** over the metal plate **22**, bending and folding the metal plate **22** to form the cheek plate frame assembly **24** including the base frame **26** and then overmolding with frame assembly **24** with a polymer overmold prior to mounting the swivel **114** in the swivel cup **82**, saves on waste by only throwing out defective overmolded frame assemblies **24** and not a whole set of handcuffs **10**.

The cheek plate assembly is overmolded with a plastic material to provide rounded edges and beveled edges for keyways and for double lock slots in the cheek plate assembly. The formation of a base frame for the cheek assembly from a die stamp metal plate results in a non-riveted base which is smooth and has a flat profile for placement on a flat surface or on another handcuff.

A flat is provided on the outer surface of the bow for lining up a point of contact of the bow with a wrist and provides smooth movement of the bow relative to the cheek plate assembly when placing the handcuff on a wrist.

The lockset assembly is removable to enable a damaged or non-functioning lockset assembly to be replaced without requiring a complete replacement of the set of handcuffs. The lockset assembly provides a simple lock mechanism with a lock bar having a locksetting slot which can be manipulated by an actuating pin on a conventional handcuff key or by the conventional handcuff key for putting the lock mechanism in a double or single lock position. Then two keyways are provided on either side of the base frame to enable a key to be inserted into the handcuff from either side of the handcuff.

The interacting parts of the lock mechanism, namely, the legs on the lock bar pawl and the spaces or cavities on the slidable double lock bar are constructed and arranged so that a key inserted through either keyway on either side of the base frame can only be rotated in one direction. Further, when the key is inserted, it is first rotated to move the double lock bar from a double lock position into a single lock position and then to move legs or fingers depending from the pawl toward the double lock bar to completely disengage the pawl from the teeth on a teeth track portion of the bow.

A deflectable detent is provided on the housing for the lockset assembly to enable the lockset assembly to be releasably locked in place and then by deflection of the deflectable detent assembly out of a locking notch in the base frame, the lockset assembly can be removed and replaced.

A two-way swivel is provided which enables an eyelet of a swivel to be placed on a chain link which is then welded solid before a pin of the swivel is inserted into a swivel cup mounted to the base frame of the cheek plate assembly. The swivel cup is swaged to the base frame to provide a solid but rotatable connection between the swivel pin of the swivel and the swivel cup when the swivel cup is swaged over the swivel pin to create a strong swivel connection.

Finally, rounded detents are formed in the side plates of the base frame and positioned to engage in track grooves on either side of the track portion of the bow for smoothly guiding the bow through the cheek assembly.

Further, it will be understood that the set of handcuffs of the present invention can be modified without departing from the teachings of the invention. Accordingly, the scope of the invention is only to be limited as necessitated by the accompanying claims.

We claim:

1. In a handcuff assembly for use in a pair of handcuffs wherein each handcuff assembly comprises a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame having an open top, opposite side walls, opposite end walls and a bottom wall and containing a lock mechanism, and two base frames connected by chain links, the improvement residing in the cheek plate assembly of each handcuff being fabricated from a single, one-piece die stamped metal plate and a two-part swivel comprising a swivel cup fixed to said bottom wall of said base frame and a swivel comprising an eyelet portion attached to a chain link and a swivel pin portion received in and fixed for rotation in said swivel cup and wherein said bottom wall of said base frame of said single, one-piece die stamped metal plate of the handcuff has an opening which receives a mounting pin extending from said swivel cup through the opening and which fixedly attaches the swivel cup to said bottom wall of said base frame.

2. The two part swivel of claim **1**, wherein said mounting pin extending from said swivel cup through the opening is swaged to fix said swivel cup to said bottom wall of said base frame.

3. The two-part swivel of claim **2**, wherein said base frame is encapsulated with a polymer overmold after said mounting pin is swaged.

4. The two-part swivel of claim **3**, wherein said swivel cup mounting pin is placed in said opening in said bottom wall of said base frame and is swaged to said bottom wall of said base frame to fix said swivel cup to said bottom wall of said base frame and to establish a cut-off for the flow of plastic during the plastic overmolding.

5. The two-part swivel of claim **1** said swivel cup includes an inner annular rib and said swivel pin portion has a reduced in diameter neck between said eyelet portion and a free end of said swivel pin portion whereby said swivel pin portion is mounted in said swivel cup by first inserting said swivel pin portion into said swivel cup with said reduced in diameter neck being aligned with said inner annular rib followed by swaging of said swivel cup about said swivel pin portion thereby to secure said inner annular rib adjacent said reduced in diameter neck portion while permitting relative rotation between said swivel cup and said swivel pin portion of said swivel.

6. In a handcuff assembly comprising a bow pivotally connected to and between cheek plates of a cheek plate assembly that also includes a base frame containing a lock mechanism, the improvement residing in said base frame being folded from a die stamped metal plate which has an opening and a swivel cup having a mounting pin being received in said opening and swaged to fix said swivel cup to said metal plate prior to the formation of said base frame.

7. The handcuff assembly of claim **6** wherein said metal plate is folded and bent to form said base frame with said swivel cup pre-mounted therein prior to mounting of a swivel in said swivel cup.

8. The handcuff assembly of claim **6** wherein said base frame of said cheek plate assembly is overmolded with a polymer overmold prior to mounting a swivel in said swivel cup.

9. A cheek plate assembly with swivel assembly for use in a pair of handcuffs comprising a unitized metal frame formed from a die stamped metal plate and having a bottom forming portion of a base frame with a hole therein, a cylindrical structure having a cylindrical opening for receiving a swivel, said cylindrical structure being fixed in said hole to said bottom forming portion of said base frame and said metal frame being folded about said bottom forming portion to form parallel spaced cheek plates of a cheek plate assembly including said base frame with said bottom forming portion.

10. The swivel assembly of claim **9** wherein a swivel is received and swaged in said cylindrical opening and includes an eyelet for being attached to a chain link.

11. The swivel assembly of claim **10** wherein said swivel includes a swivel pin which is received and swaged in said cylindrical opening.

12. The swivel assembly of claim **9** wherein said cylindrical structure is fixed to said bottom forming portion prior to the folding of said metal plate.

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